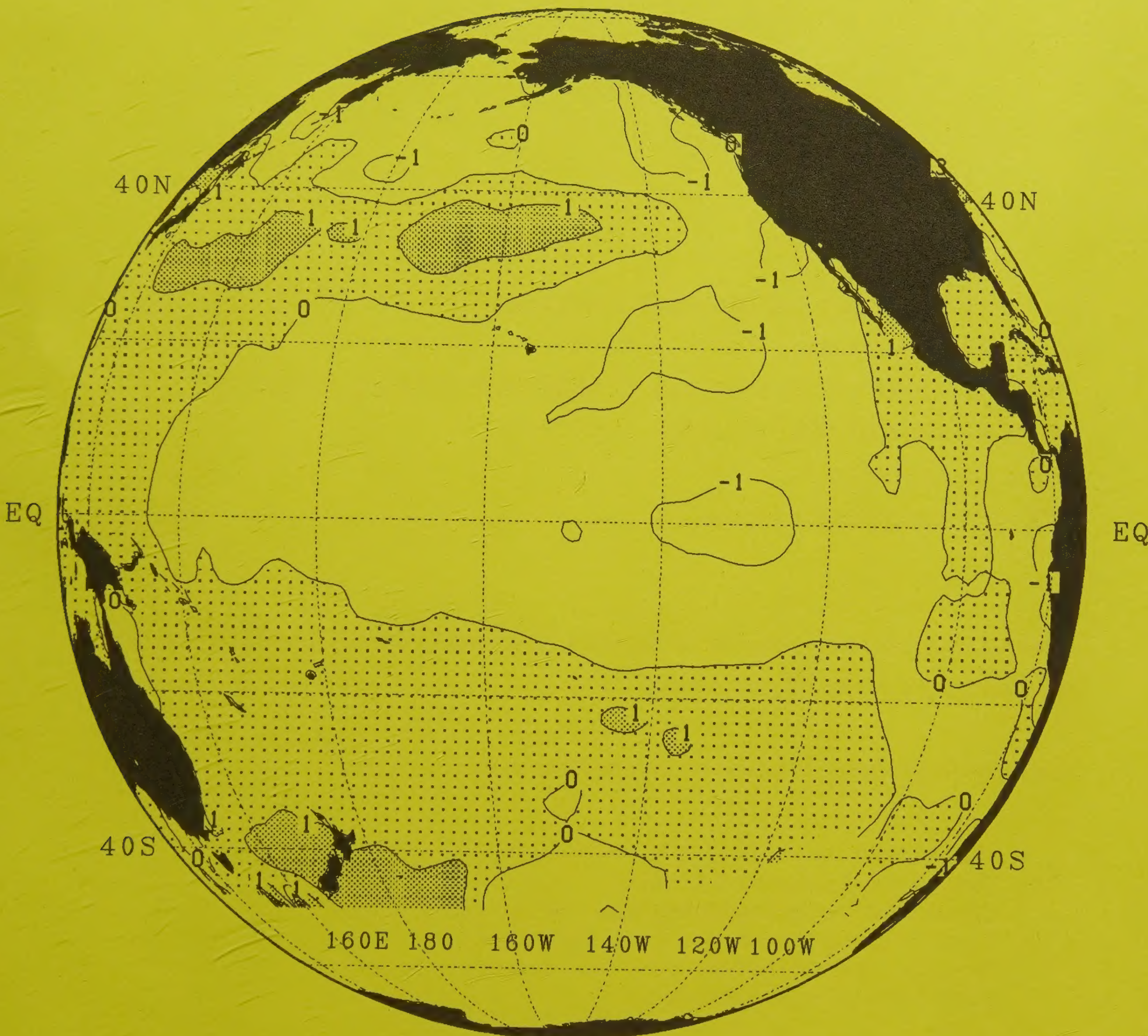
気象庁海洋月報

Monthly Ocean Report

June 1999 (No. 78)



Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

平成11年6月

気象庁海洋月報は、気象庁 気候・海洋気象部 海洋課で作成しています。

本月報に関する問い合わせは、

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Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

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表紙は、1999年6月の太平洋の月平均海面水温偏差図です。

陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for June 1999 in the Pacific Ocean.

Areas of positive anomalies are shaded.

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海況の特徴（１９９９年６月）

日本近海の海況

海面水温は、40゜N以北の日本海及び北海道周辺から三陸・常磐沖にかけて、平年より１℃以上高かった。東海沖及び沖縄の南で平年より0.5℃以上低かった（第4図）。

黒潮は、九州から紀伊半島にかけて接岸し、33゜Nに沿って東に流れた後、八丈島の北を通り北東に流れていた。その後、房総半島の東で向きを変え、34゜N、144゜E付近を中心とする冷水渦の南を蛇行していた（第5〜7図、第9図）。

親潮系の冷水の沿岸寄りの分枝は41.5゜N、143.5゜Eまで、沖合の分枝は39.5゜N、146.5゜Eまで、それぞれ達していた（第5図）。

太平洋の海況

太平洋赤道域の海面水温は、日付変更線から120゜Wにかけてと90゜W以東で平年より0.5℃以上低かった。一方、140゜E付近では平年より0.5℃以上高かった。

北太平洋では、25゜N、140゜Eから40゜N、145゜Wにかけて平年より１℃以上高かった。一方、40゜N以北の海域及び160゜E以東の赤道域からカリフォルニア沖にかけての広い範囲で負偏差となっていた（第16図）。

Highlights June 1999

Seas adjacent to Japan

SSTs were more than 1°C above normal north of 40°N in the Japan Sea, the seas around Hokkaido, off Sanriku and off Joban. Negative SST anomalies exceeding -0.5°C were found off Tokai and south of Okinawa (Fig. 4).

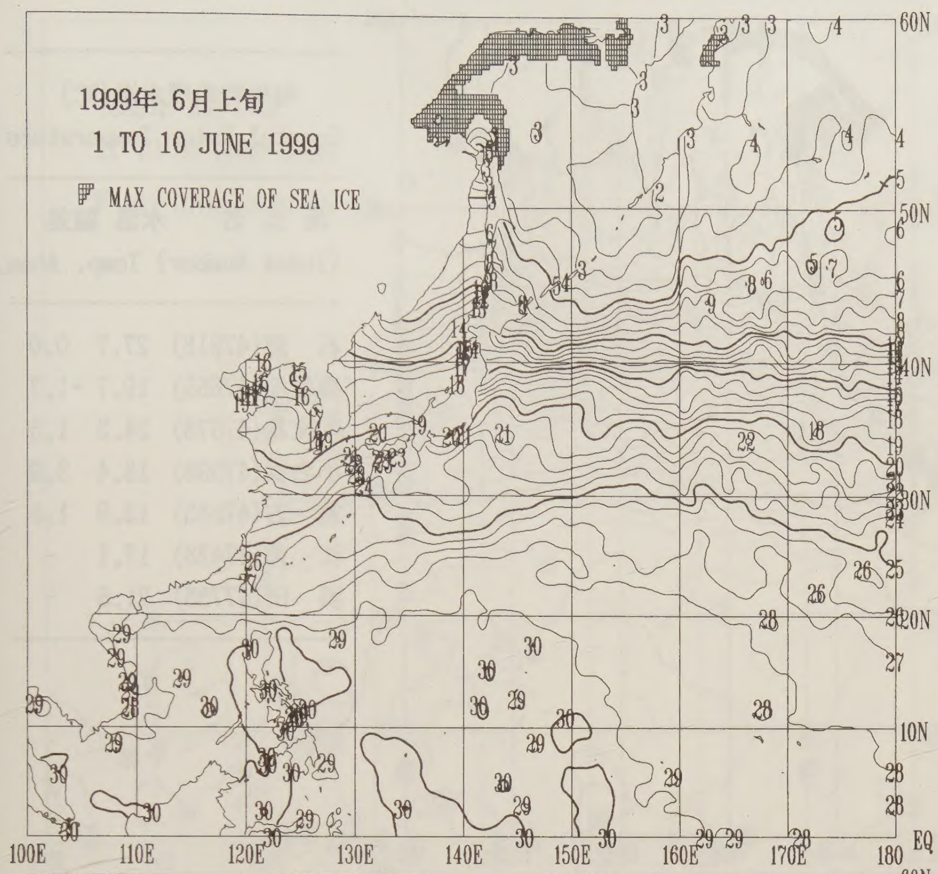
The Kuroshio flowed along the coasts from Kyushu to the Kii Peninsula, then eastward along 33°N. After passing north of Hachijo Island it flowed NE-ward, then turned SE-ward off the Boso Peninsula and meandered along the southern rim of the cold eddy centered at 34°N, 144°E (Figs. 5-7, Fig. 9).

Coastal and off-coastal branches of the Oyashio cold water extended southward to 41.5°N, 143.5°E and 39.5°N, 146.5°E, respectively (Fig. 5).

Pacific Ocean

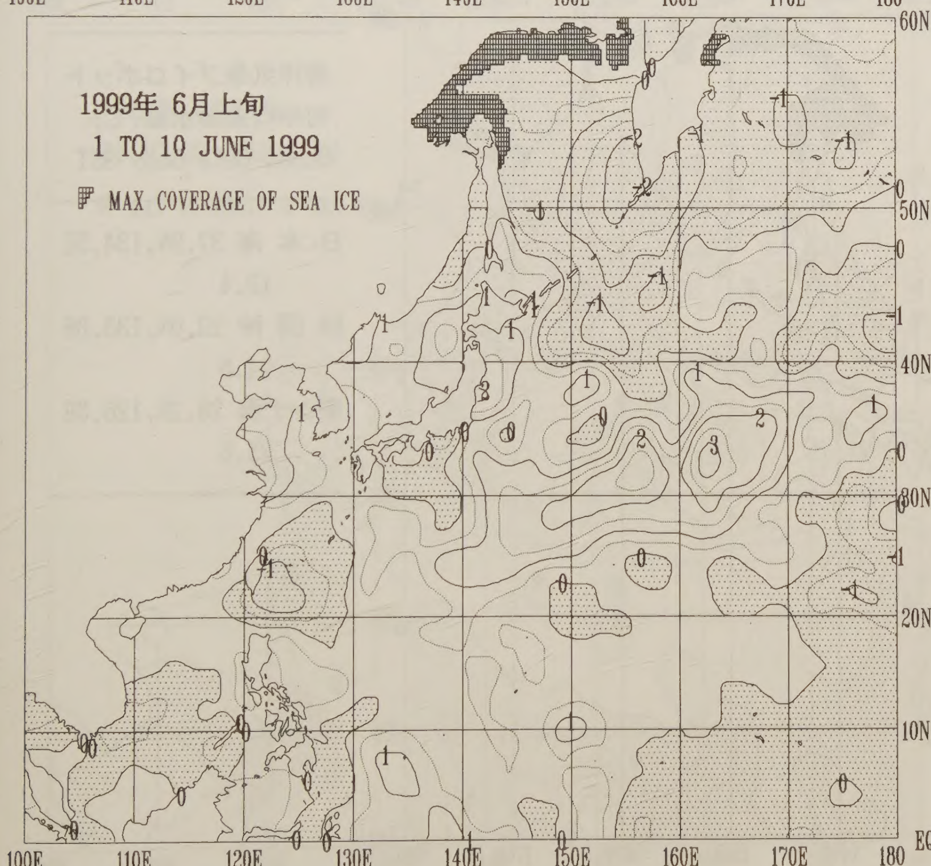
In the equatorial Pacific, negative SST anomalies exceeding -0.5°C were found from the date line to 120˚W and east of 90˚W. SSTs were more than 0.5°C above normal around 140˚E.

In the North Pacific, positive SST anomalies exceeding +1°C prevailed from 25°N, 140˚E to 40°N, 145˚W. On the other hand SSTs were below normal widely in the seas north of 40°N and from 160˚E in the equatorial Pacific to off California (Fig. 16).



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	26.6	-0.3
御前崎(47655)	19.4	-1.4
八丈島(47678)	23.7	1.6
小名浜(47598)	17.4	3.0
宮　古(47585)	13.3	1.9
江　差(47428)	13.5	-
浜　田(47755)	20.4	-

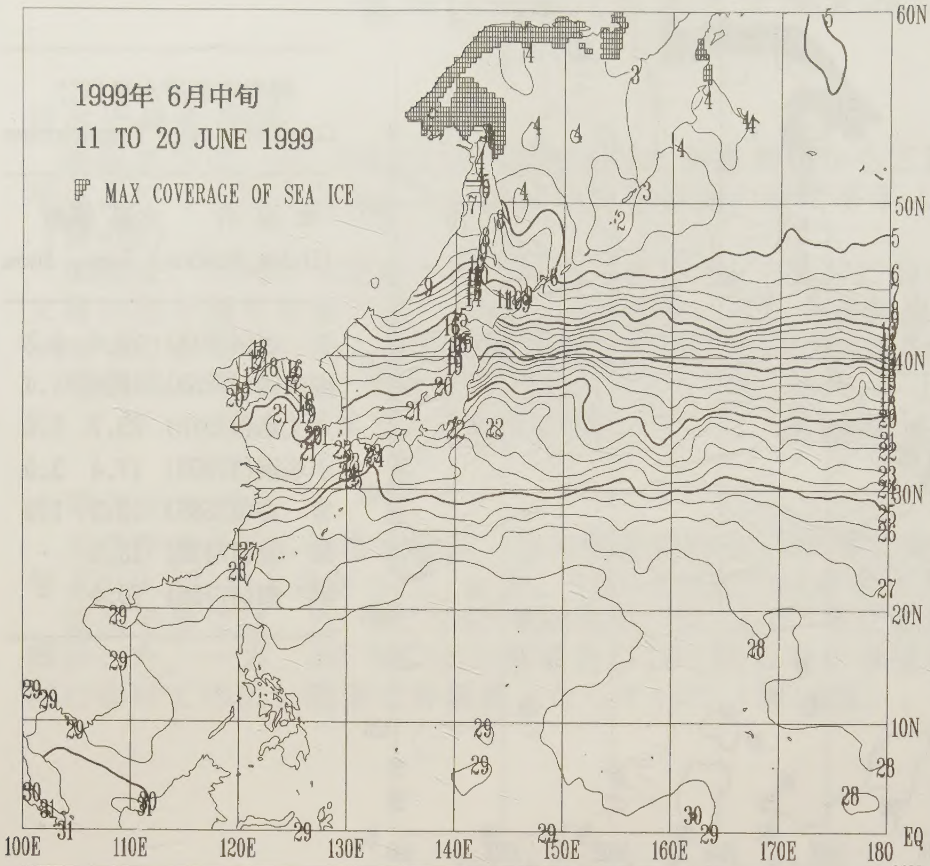


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

地点	位置	水温
日本海	37.9N,134.5E	17.5
四国沖	29.0N,135.0E	23.9
東シナ海	28.2N,126.3E	25.4

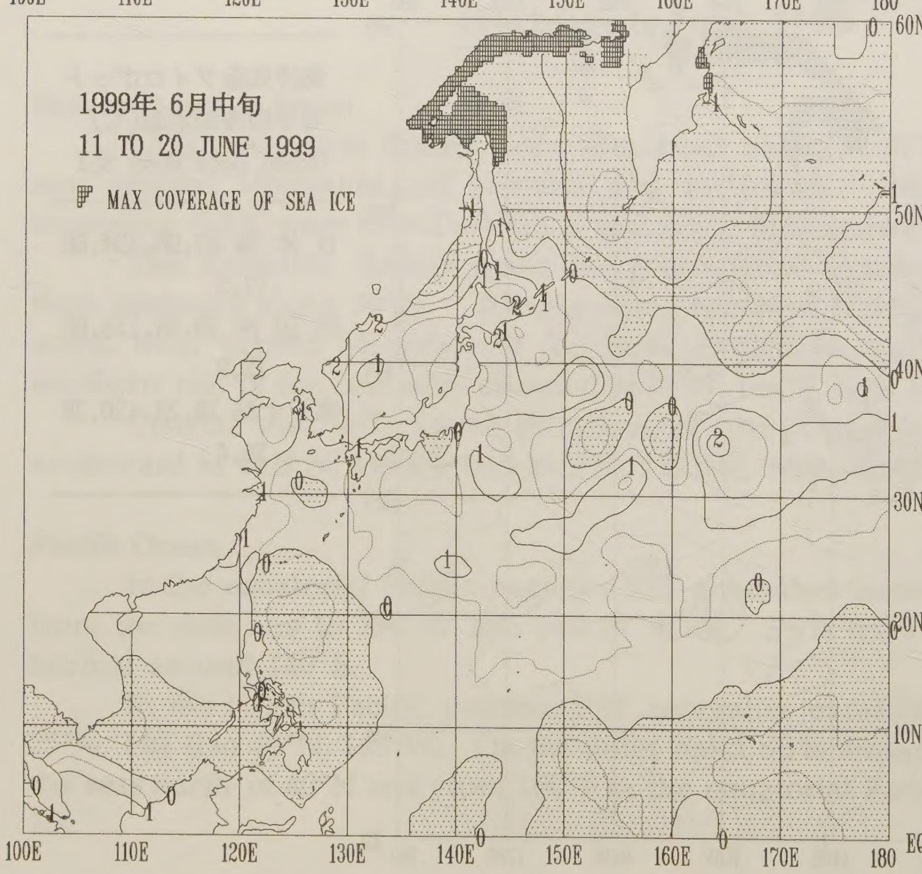
第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1999年 6月上旬)

Fig.1 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 1st ten-day period in JUN 1999. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	27.7	0.0
御前崎(47655)	19.7	-1.7
八丈島(47678)	24.3	1.5
小名浜(47598)	18.4	3.9
宮　古(47585)	13.9	1.5
江　差(47428)	17.1	-
浜　田(47755)	21.6	-



海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海 37.9N,134.5E
19.4

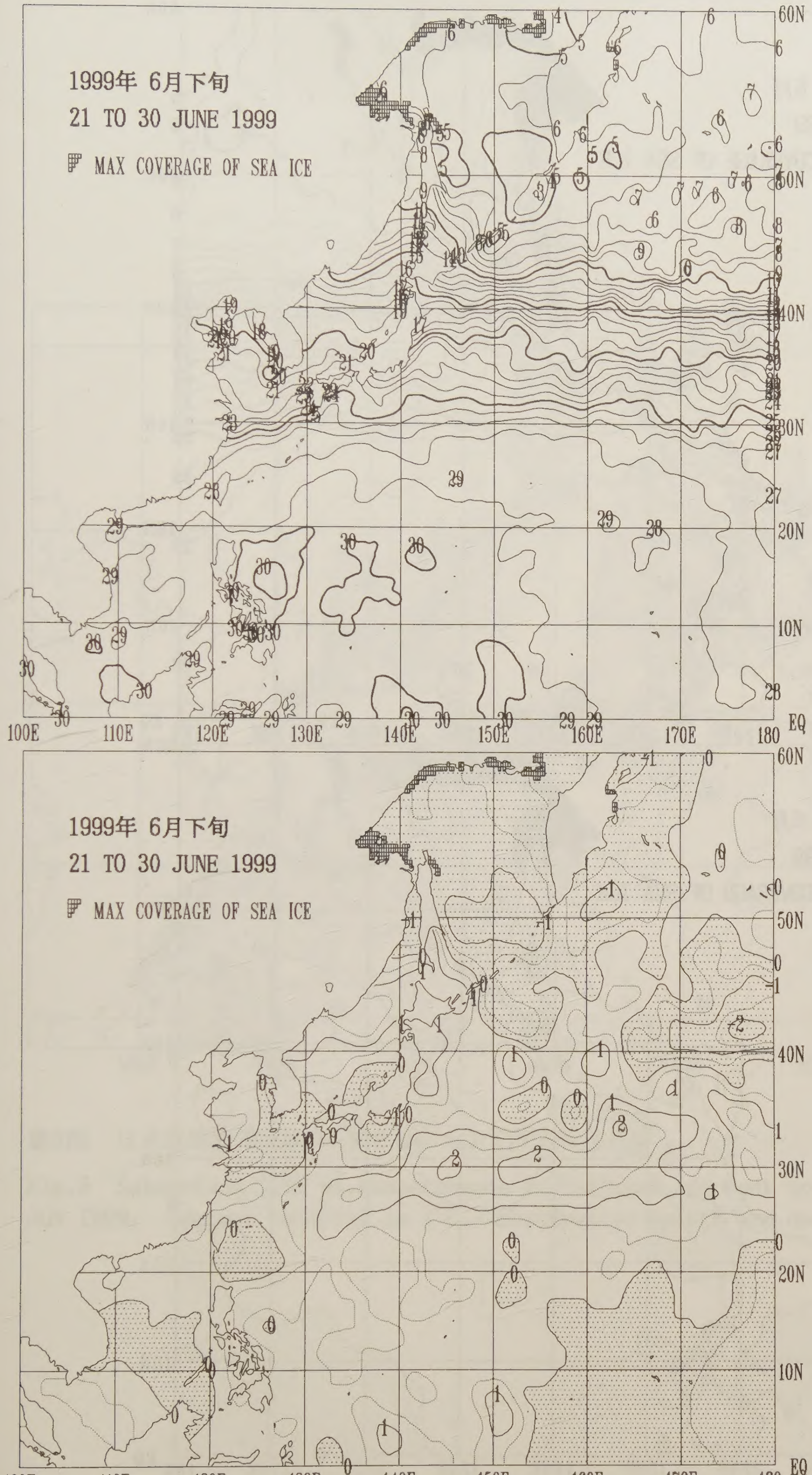
四国沖 29.0N,135.0E
24.5

東シナ海 28.2N,126.3E
25.6

第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1999年 6月中旬)

Fig.2 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 2nd ten-day period in JUN 1999. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.

Ten-day mean SST & Anomalies



旬平均沿岸水温(℃)
Coastal Water Temperature

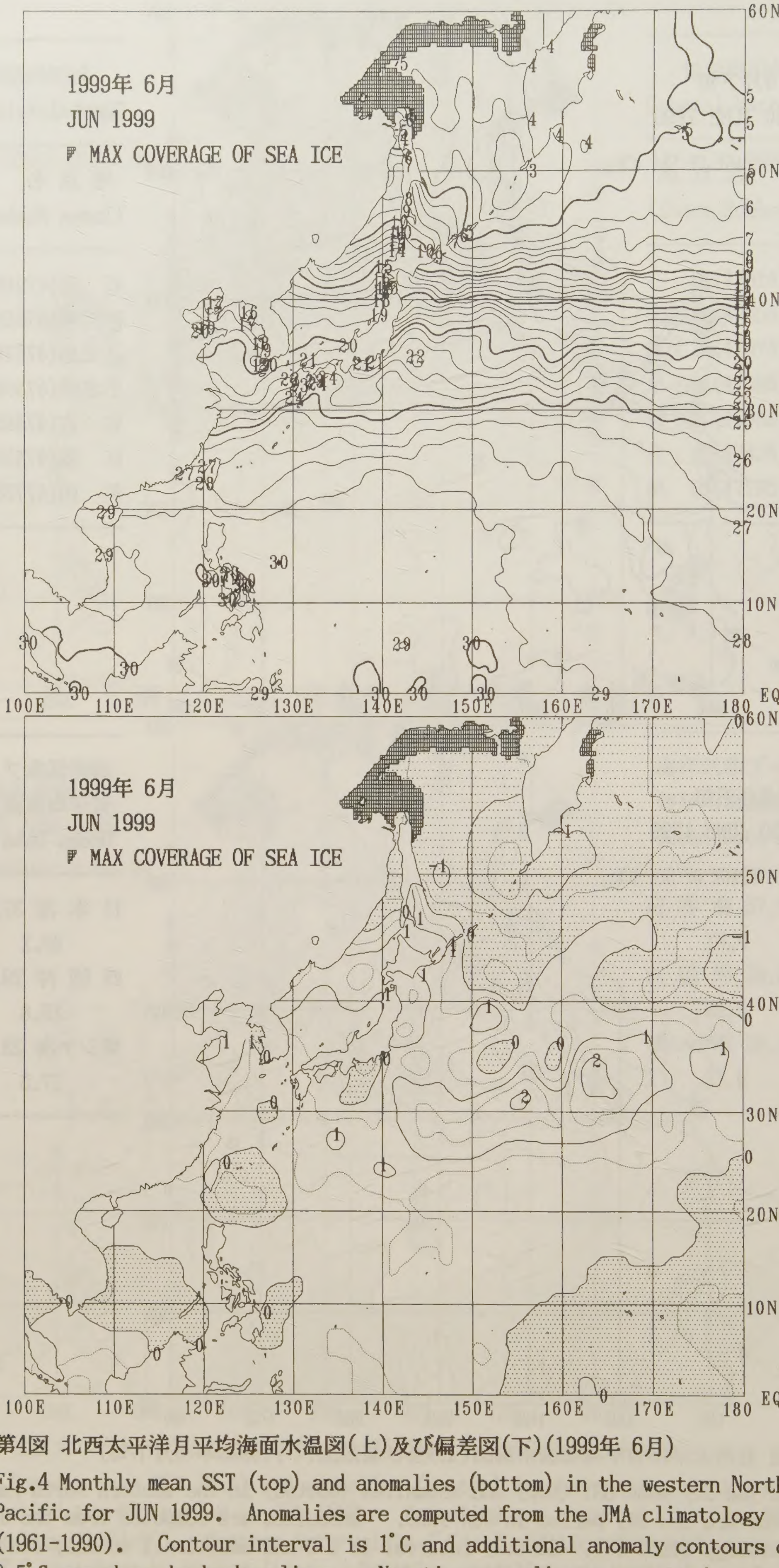
地 点 名 (Index Number)	水温 Temp.	偏差 Anom.
石 垣(47918)	27.9	-0.6
御前崎(47655)	20.0	-1.9
八丈島(47678)	25.1	1.6
小名浜(47598)	17.6	2.0
宮 古(47585)	14.6	1.1
江 差(47428)	17.7	-
浜 田(47755)	21.7	-

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日 本 海	37.9N,134.5E	20.2
四 国 沖	29.0N,135.0E	26.8
東シナ海	28.2N,126.3E	27.3

第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1999年 6月下旬)

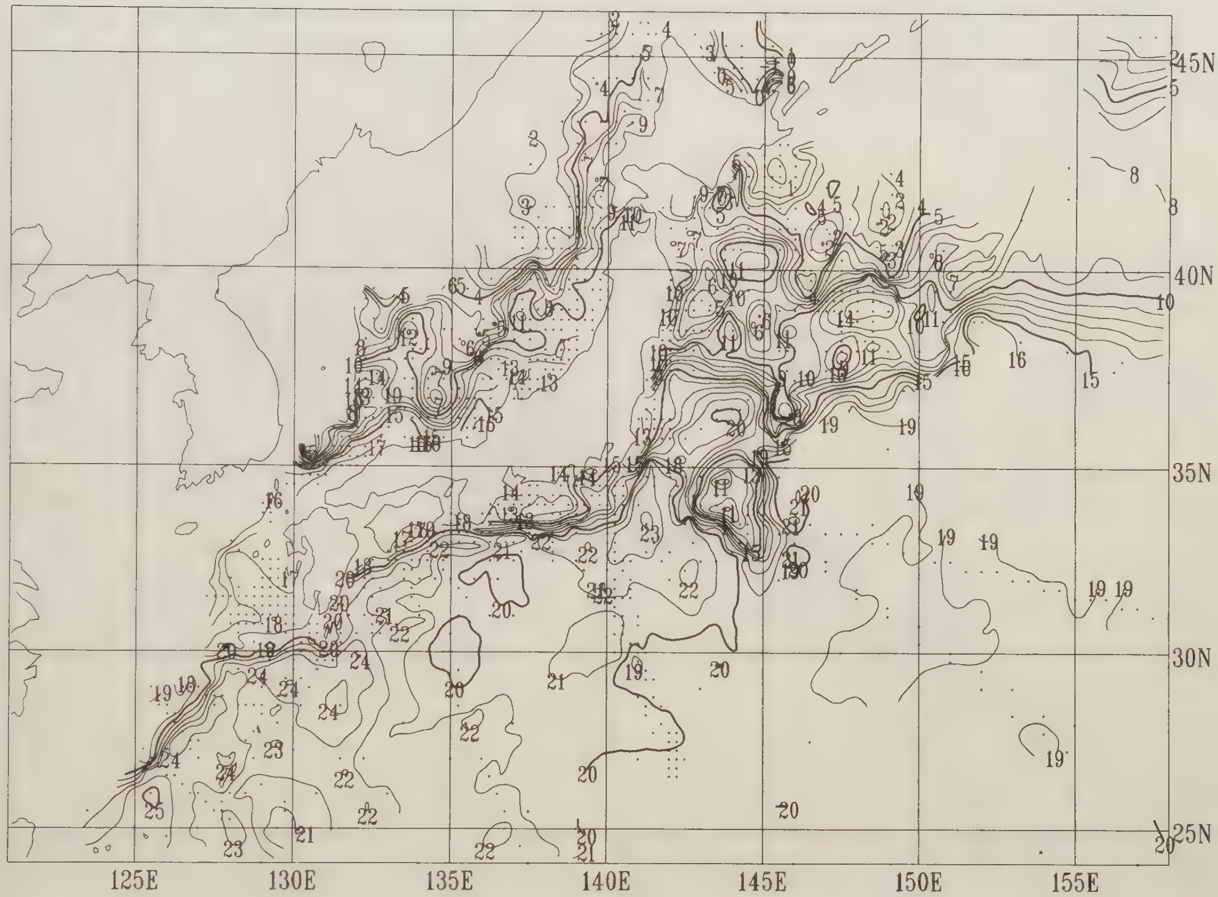
Fig.3 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 3rd ten-day period in JUN 1999. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1999年 6月)

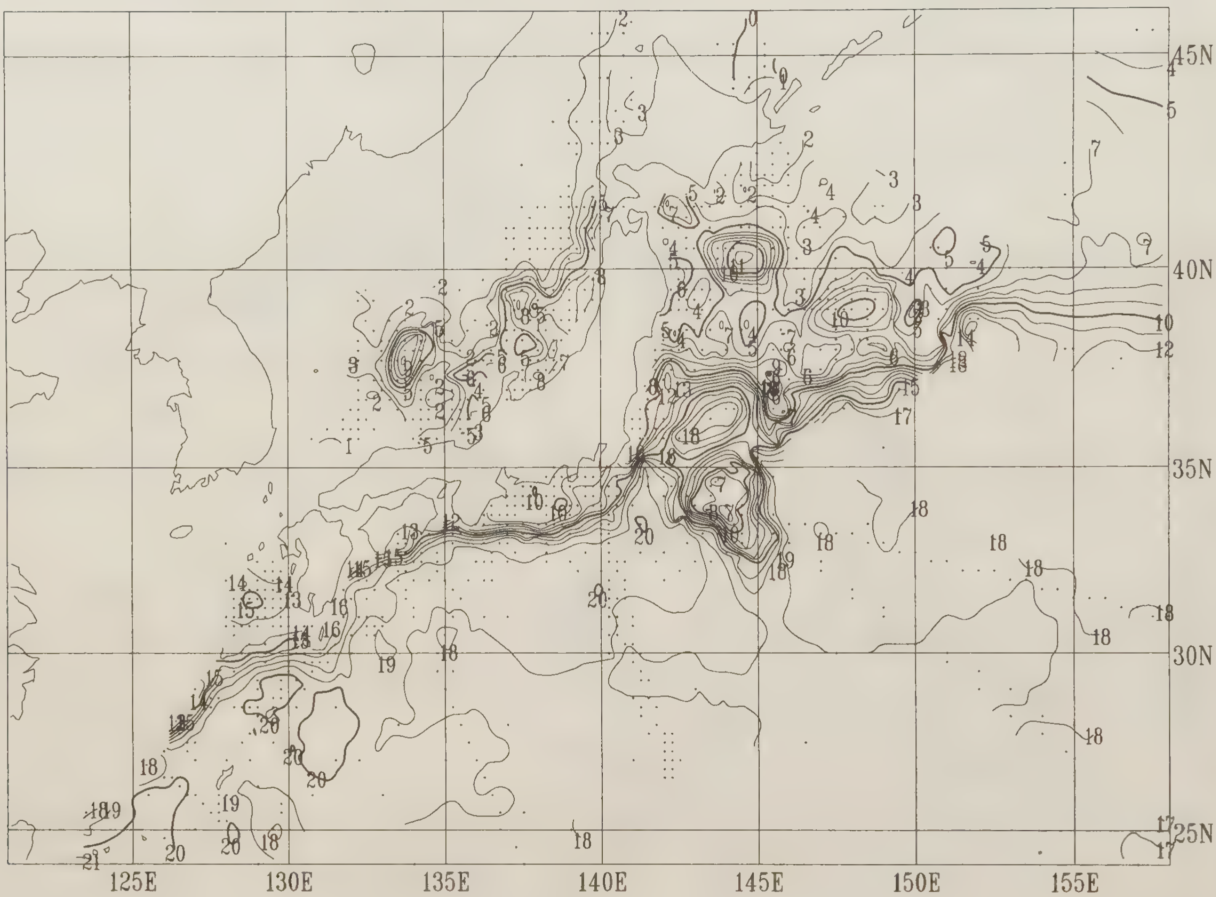
Fig.4 Monthly mean SST (top) and anomalies (bottom) in the western North Pacific for JUN 1999. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.

100m Temperatures in the Seas Adjacent to Japan



第5図　日本近海表層水温図(深さ100 m) (1999年 6月)

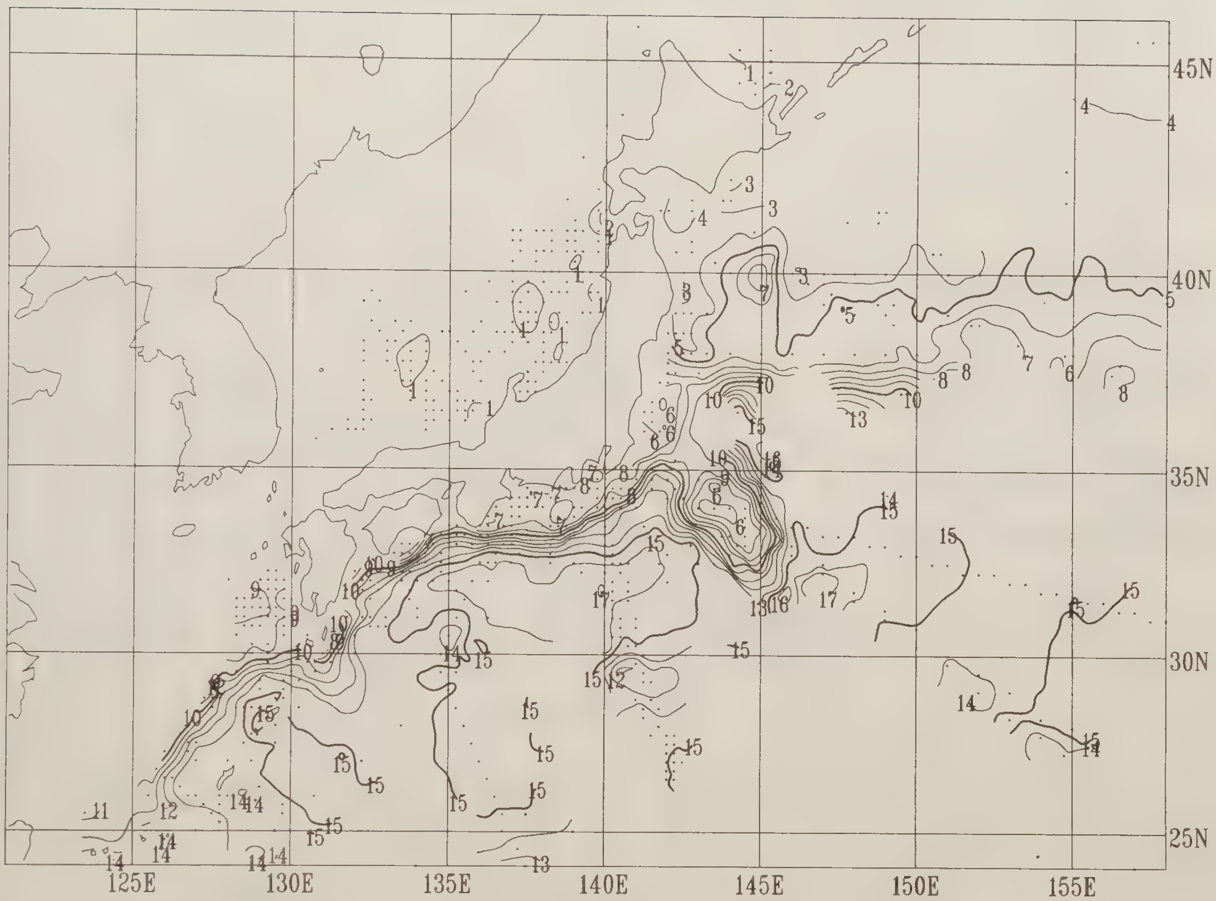
Fig.5 Subsurface (100 m) temperatures in the seas adjacent to Japan for JUN 1999. Contour interval is 1°C. Observation points are denoted by dots.



第6図　日本近海表層水温図(深さ200 m) (1999年 6月)

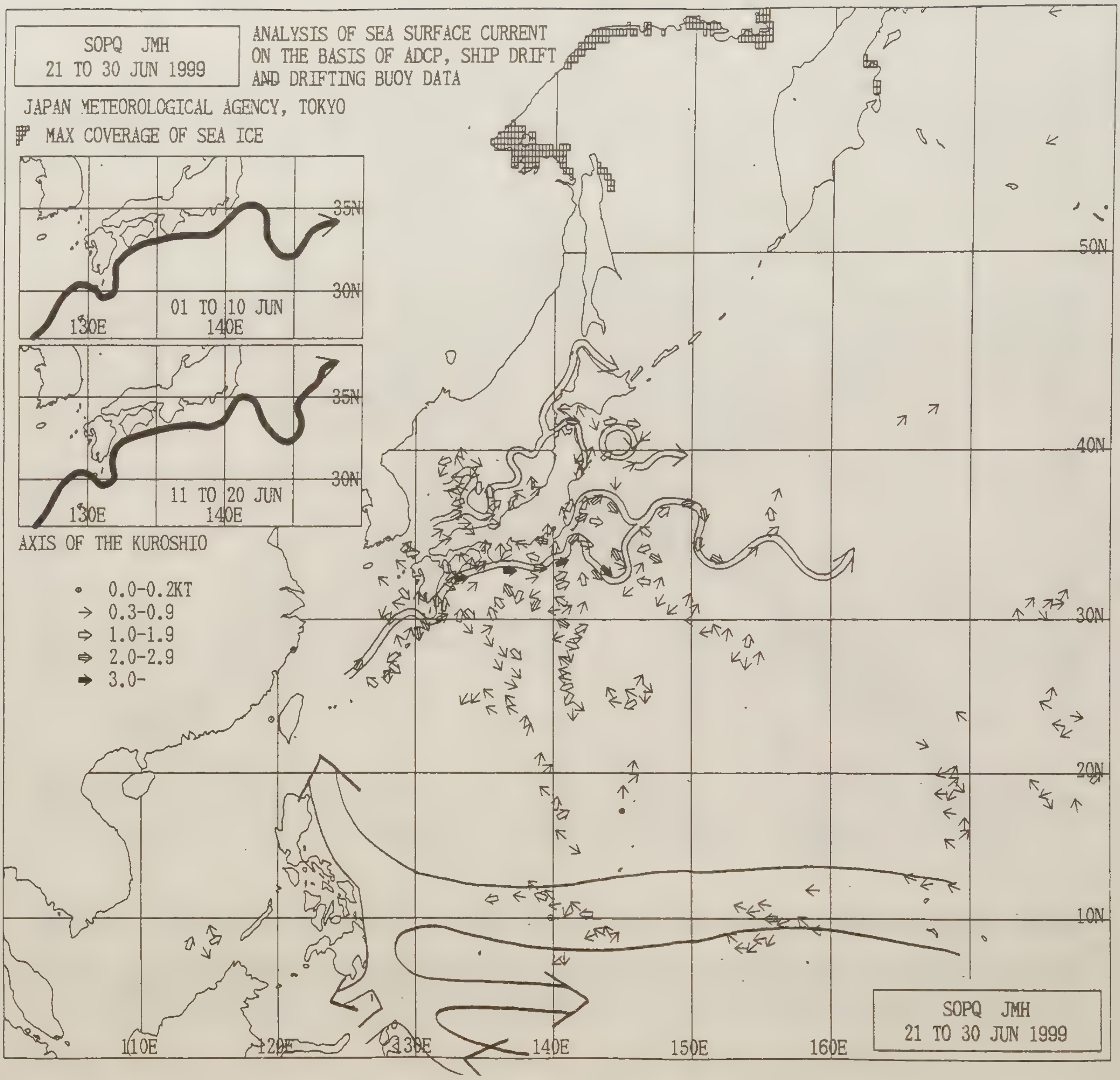
Fig.6 Subsurface (200 m) temperatures in the seas adjacent to Japan for JUN 1999. Contour interval is 1°C. Observation points are denoted by dots.

400m Temperatures in the Seas Adjacent to Japan



第7図　日本近海表層水温図(深さ400 m) (1999年 6月)

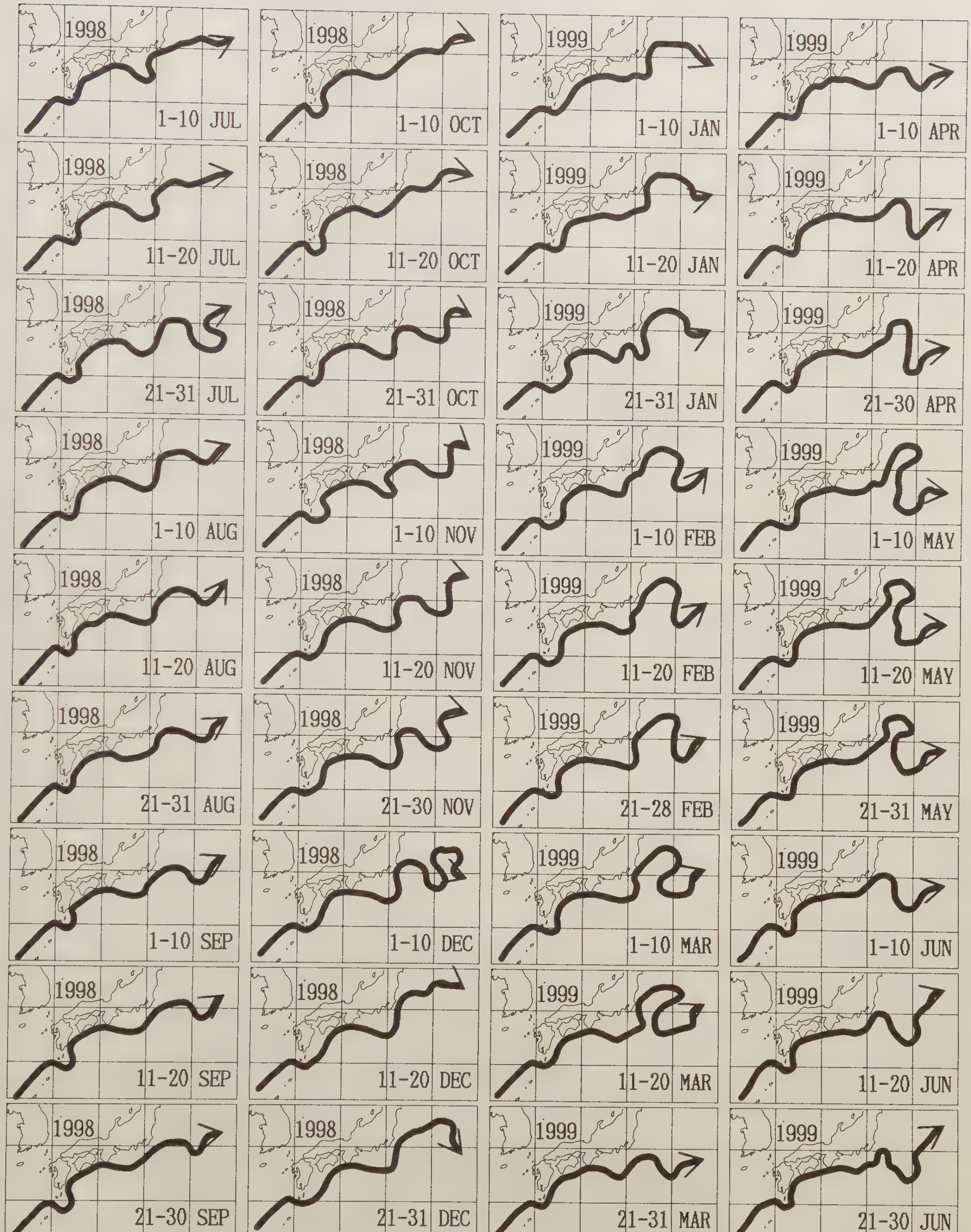
Fig.7 Subsurface (400 m) temperatures in the seas adjacent to Japan for JUN 1999. Contour interval is 1°C. Observation points are denoted by dots.



第 8 図　北西太平洋海流図（1999 年 6 月下旬）

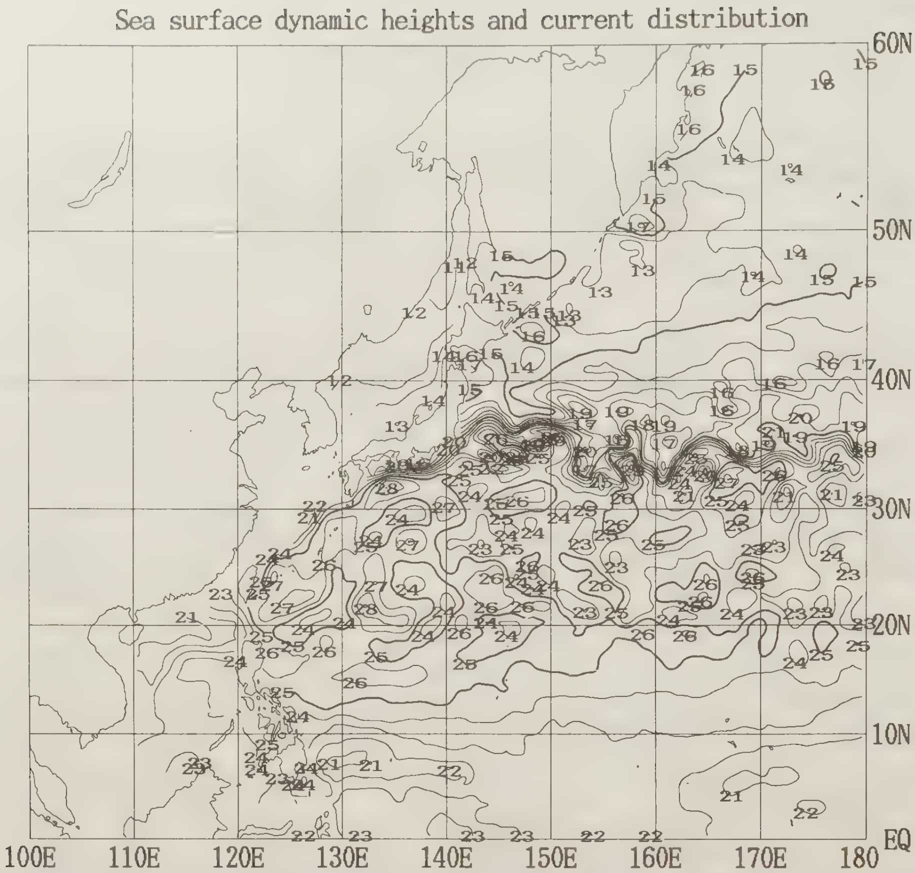
Fig. 8　Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in June 1999. Small arrows indicate *in situ* observations. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

Location of the Kuroshio axis

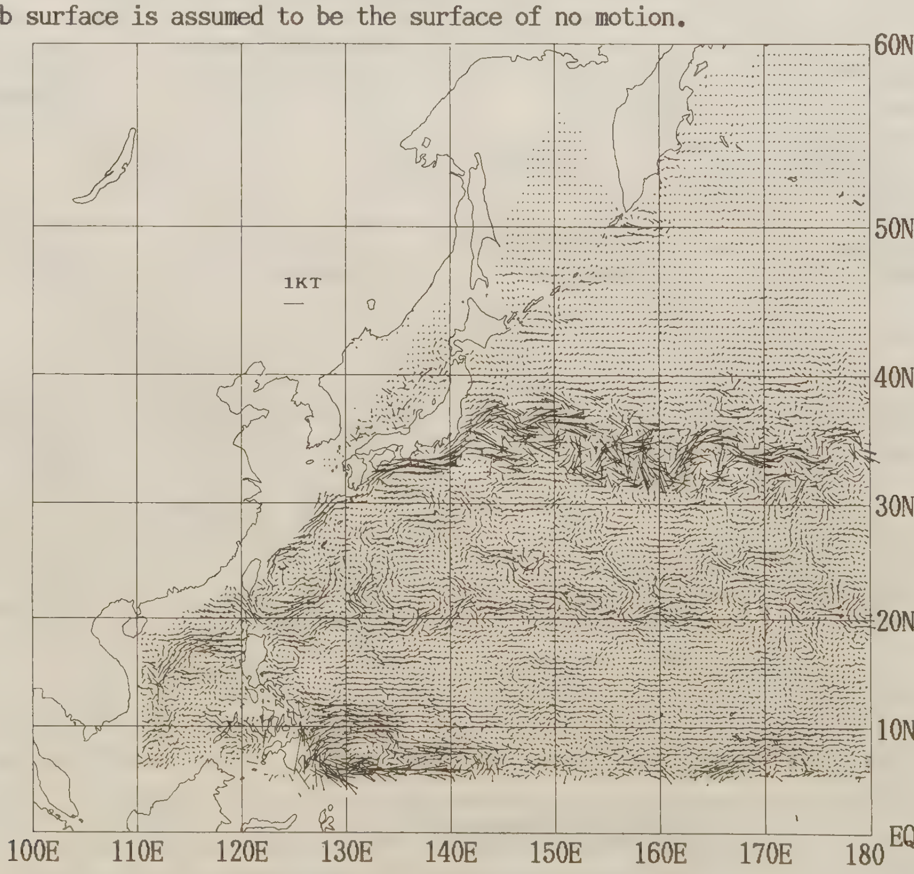


第9図 旬別黒潮流軸図

Fig.9 Location of the Kuroshio axis

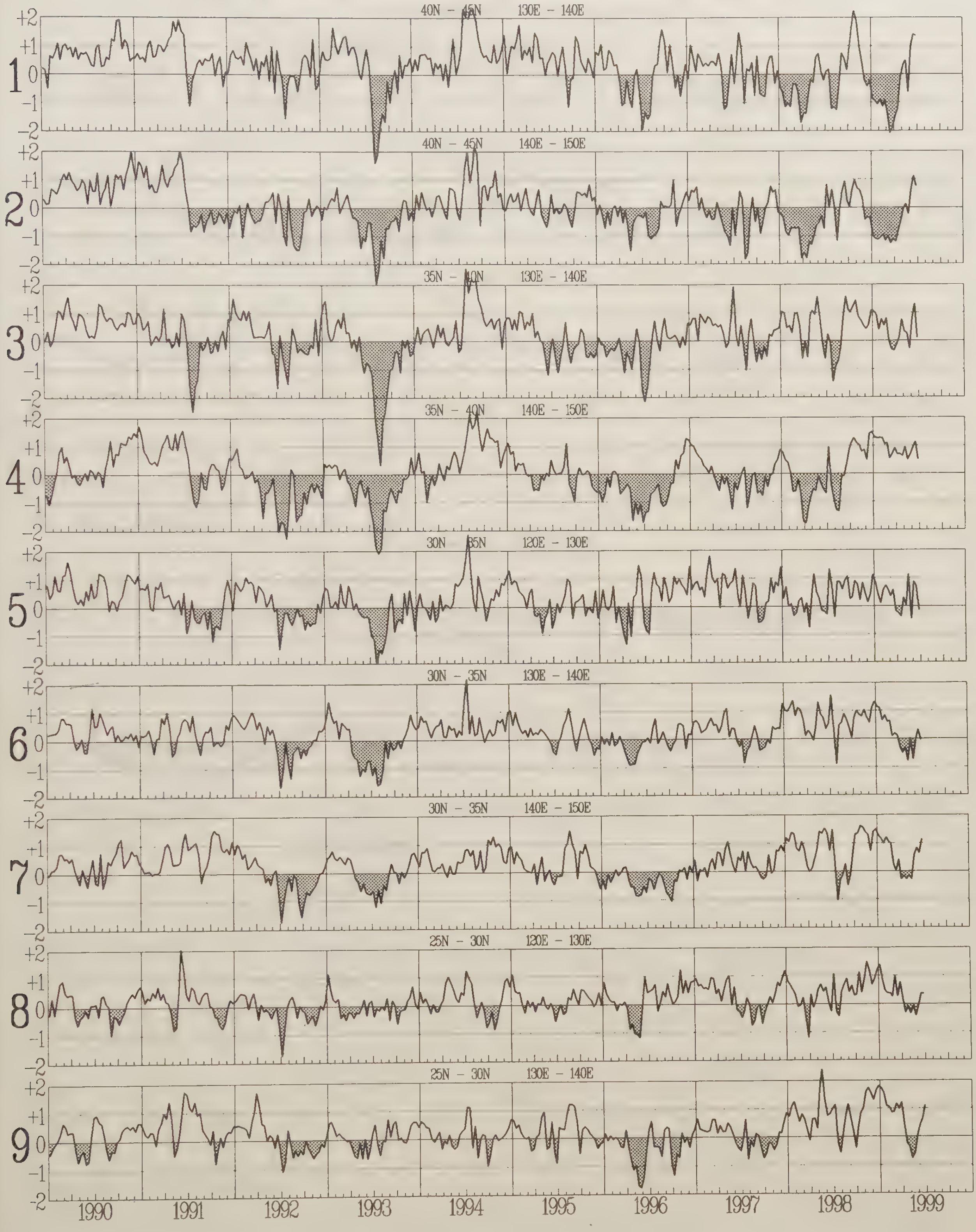


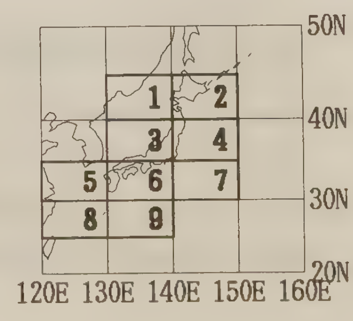
第10図 北西太平洋力学的海面高度分布図(1999年 5月25日)
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1500db surface is assumed to be the surface of no motion.



第11図 北西太平洋海流ベクトル図(1999年 5月25日)
Fig.11 Sea surface current vectors in the western North Pacific (MAY 25, 1999). Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and subsurface temperature distribution assuming the geostrophic relation.

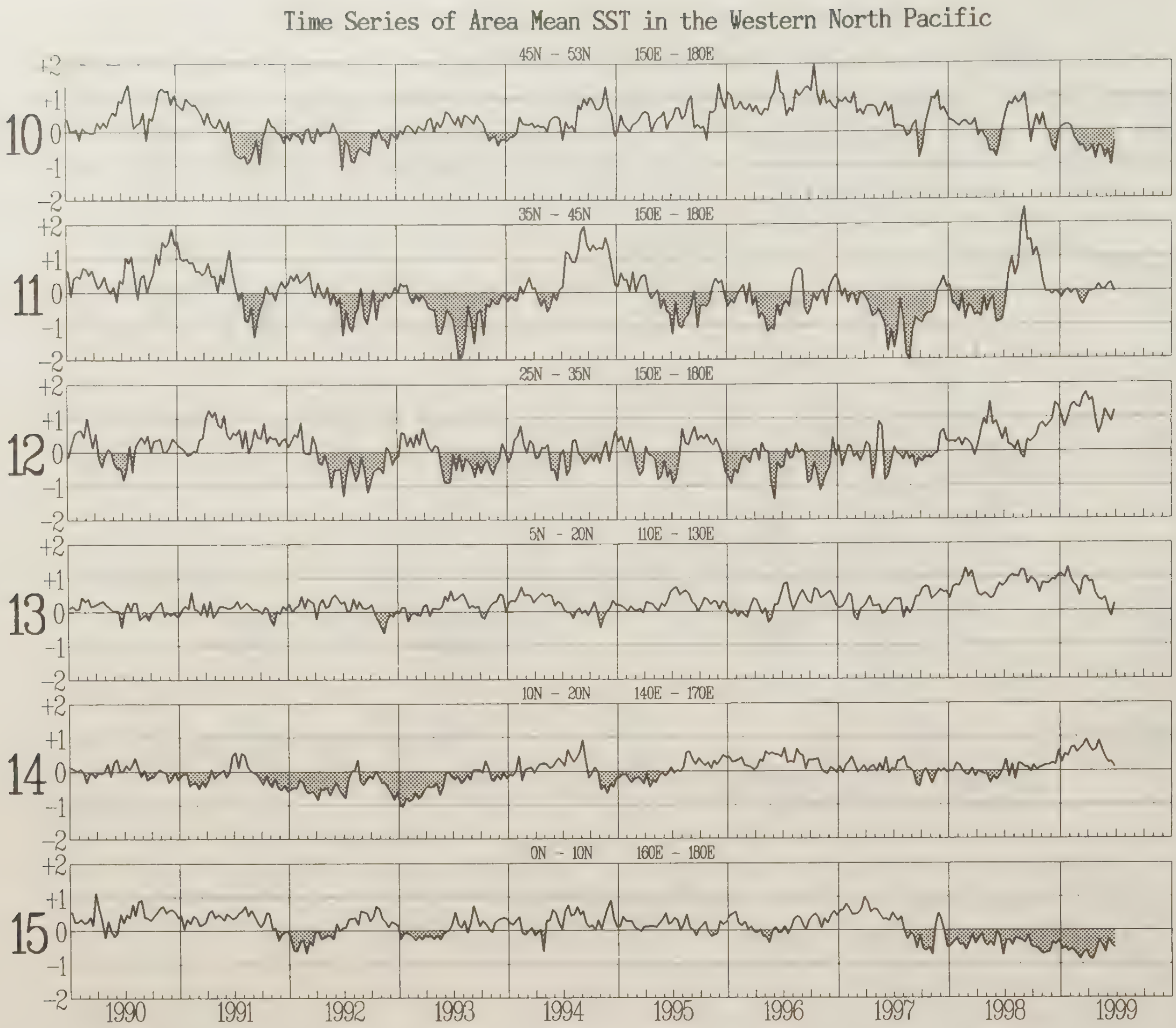
Time Series of Area Mean SST in the Western North Pacific





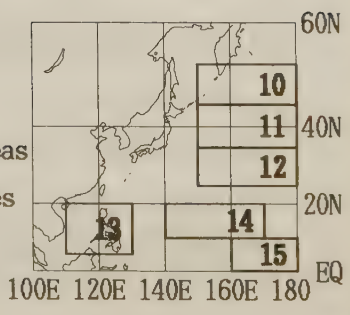
第12図　海域別旬平均海面水温平年偏差時系列図

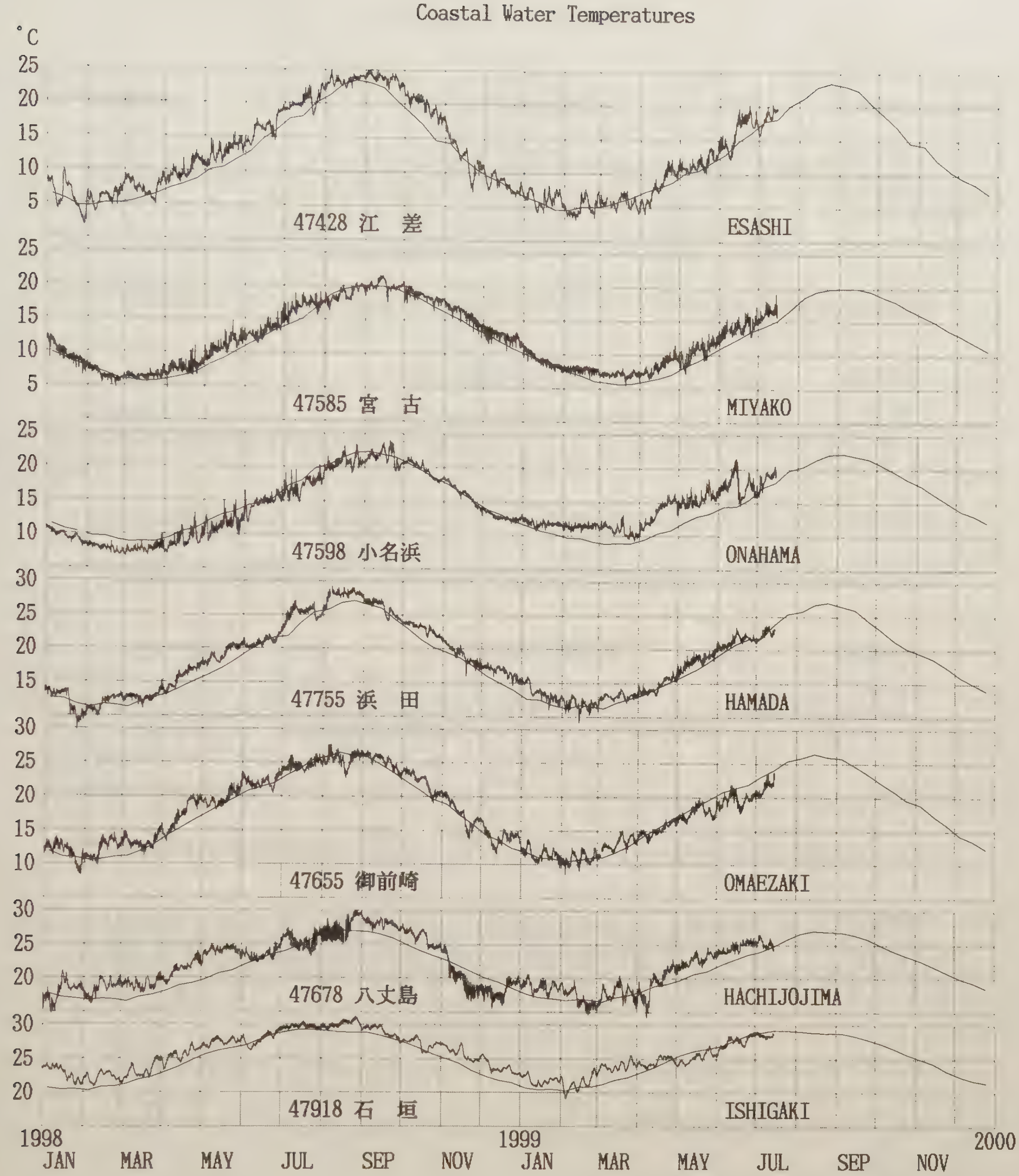
Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

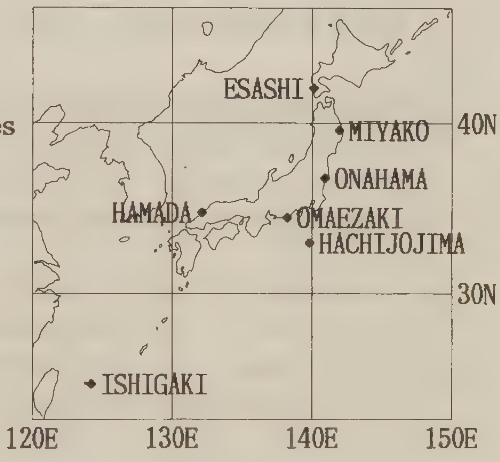


第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).



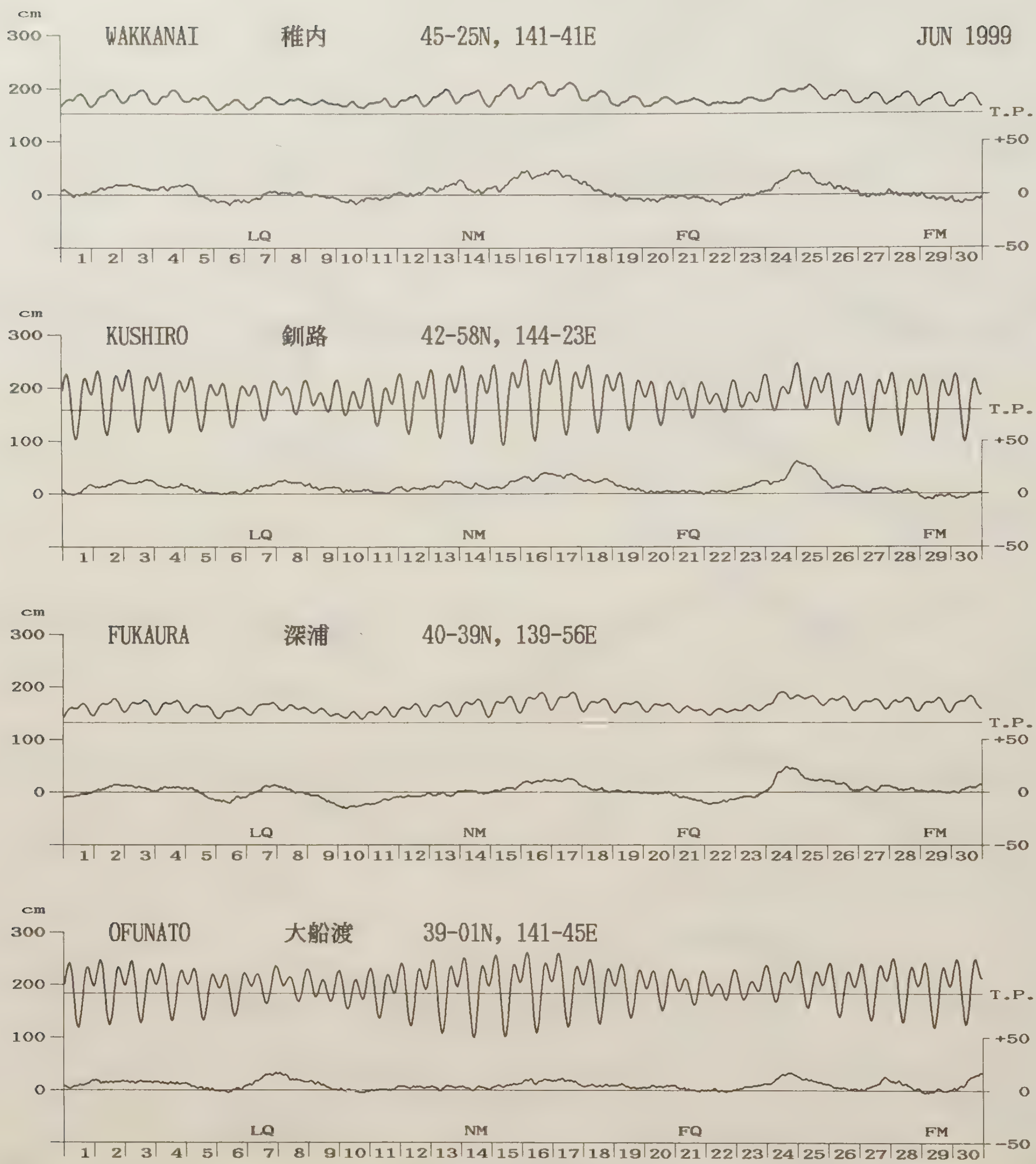




第13図 沿岸水温時系列図

Fig.13 Time series of hourly coastal water temperatures (°C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show ten-day mean climatology.

Time Series of Sea Level

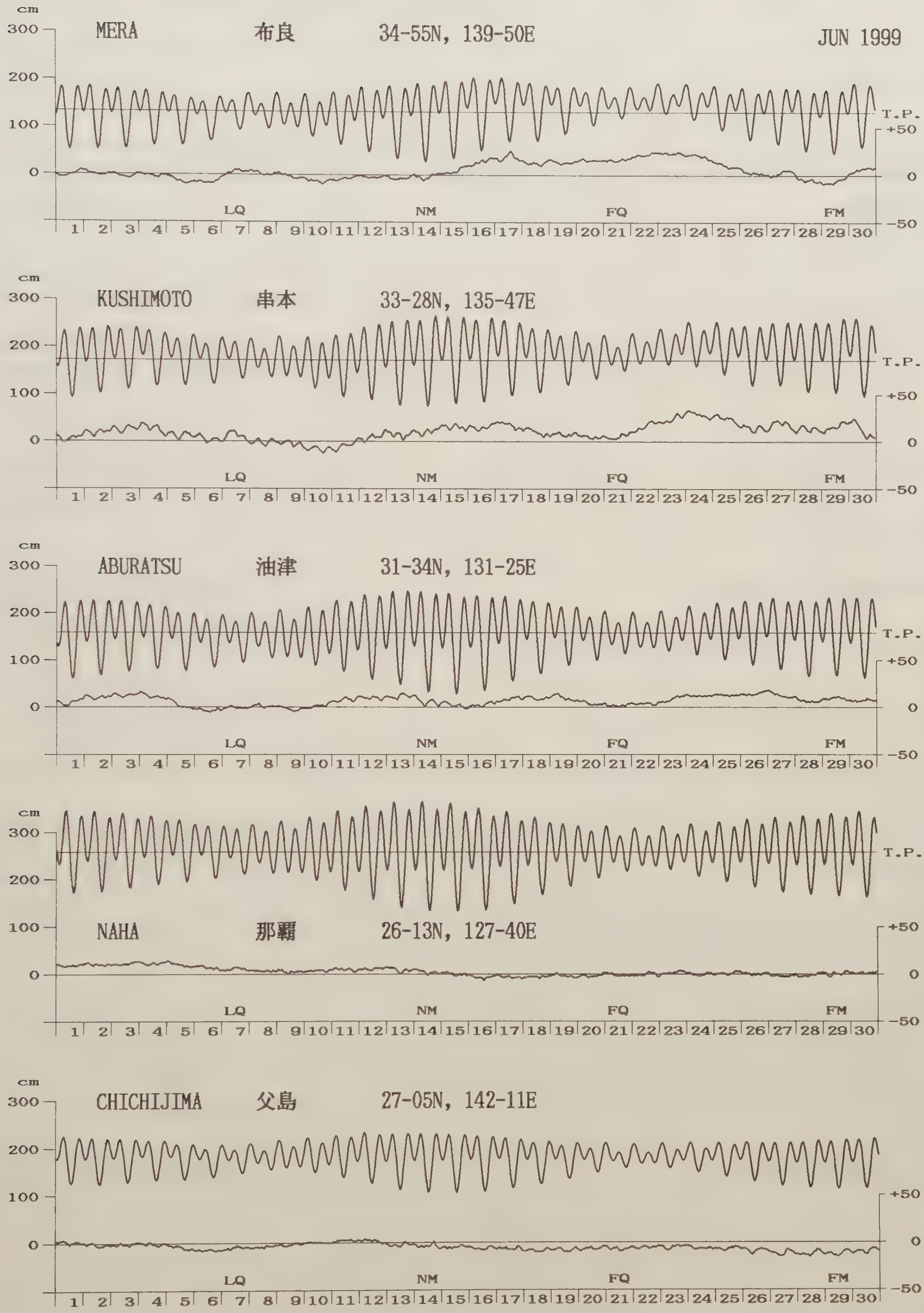


第14図 沿岸潮位時系列図 (1999年 6月)

Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.

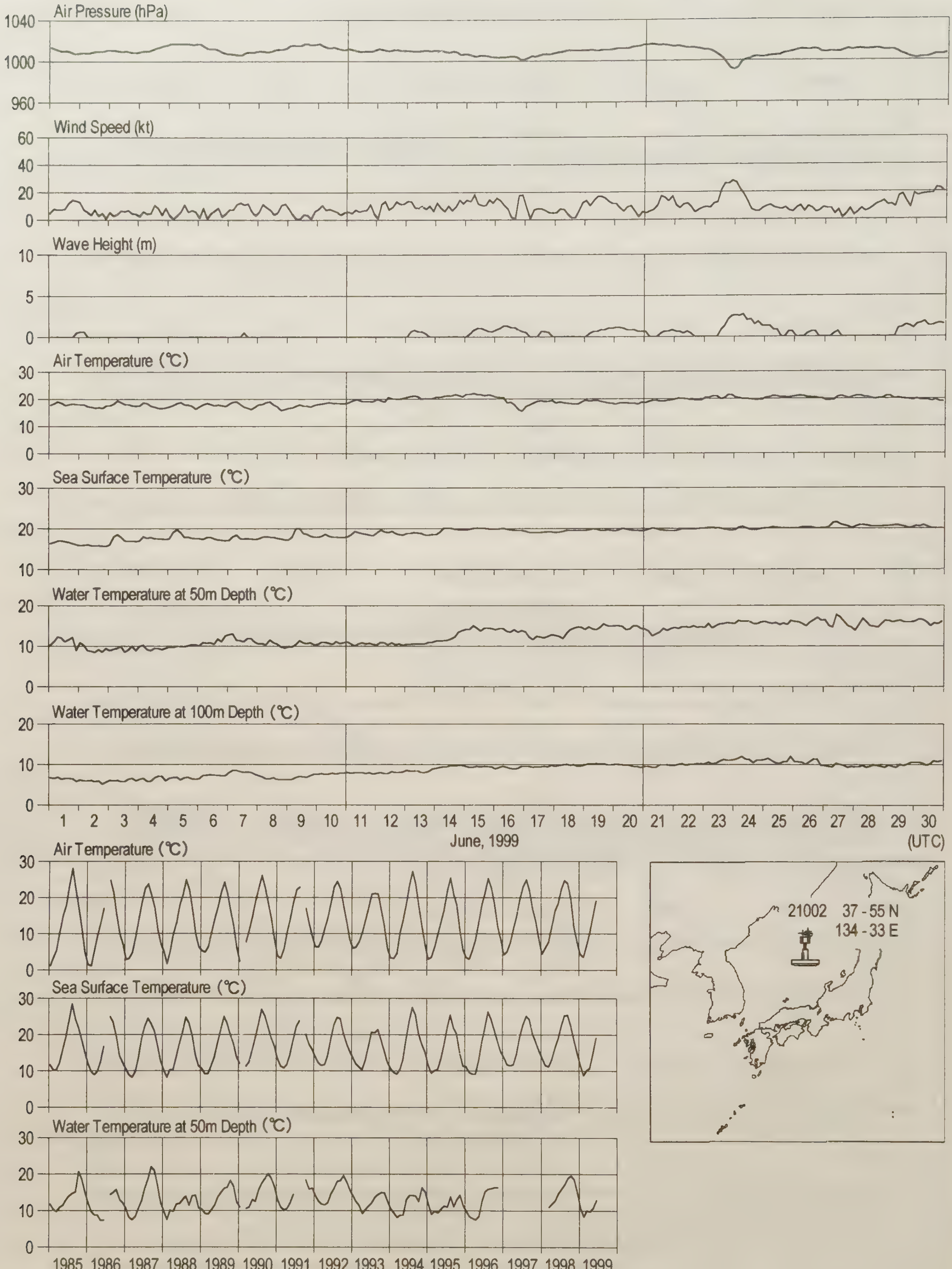


NM: new moon, FQ: first quarter
FM: full moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



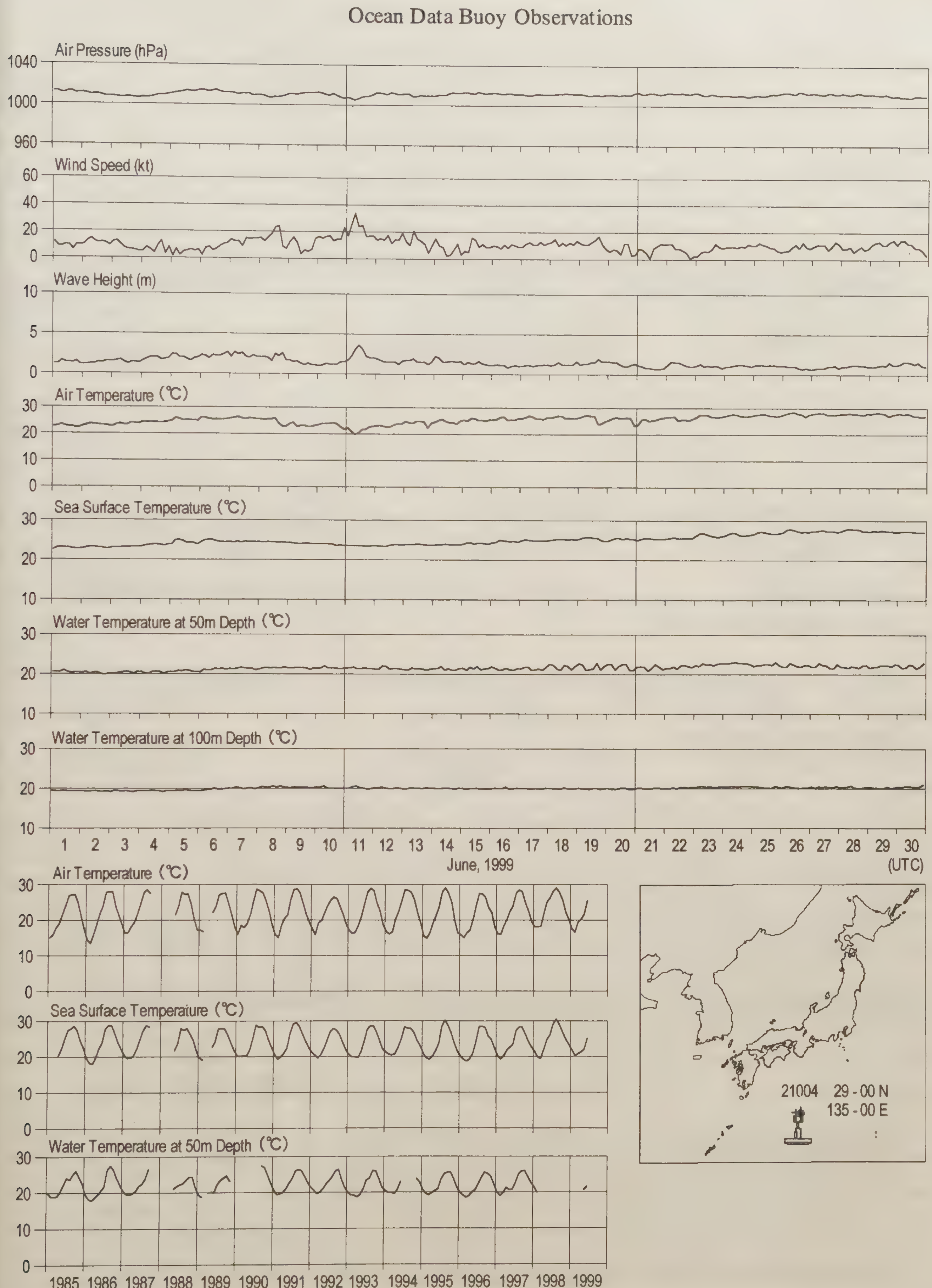
第14図 つづき
Fig.14 continue

Ocean Data Buoy Observations



第15図　　海洋気象ブイロボットによる観測要素の時系列図（日本海：21002）
上段は３時間毎の観測値を、下段は月平均値を示す。

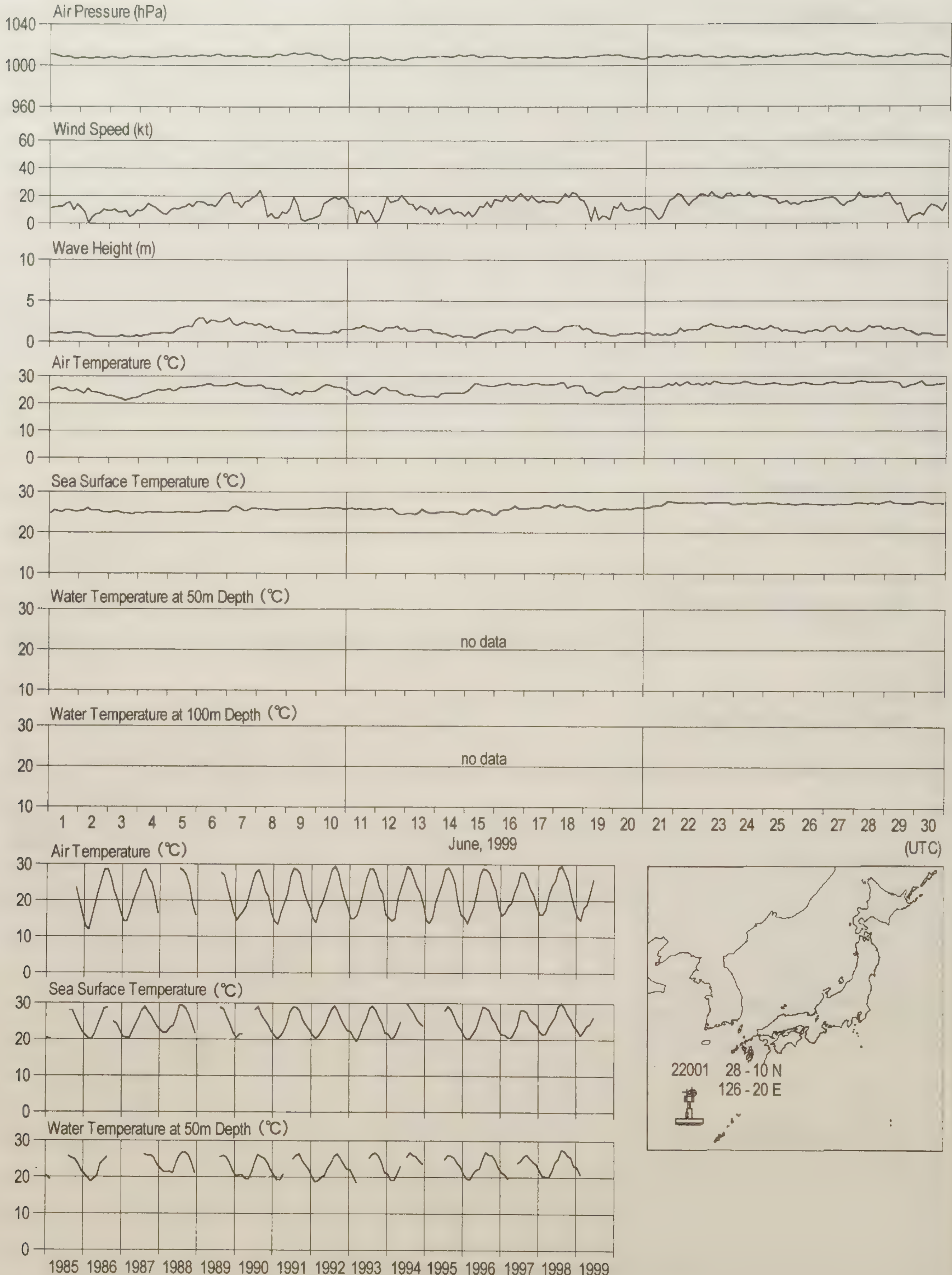
Fig.15　　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



第15図　海洋気象ブイロボットによる観測要素の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig.15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.

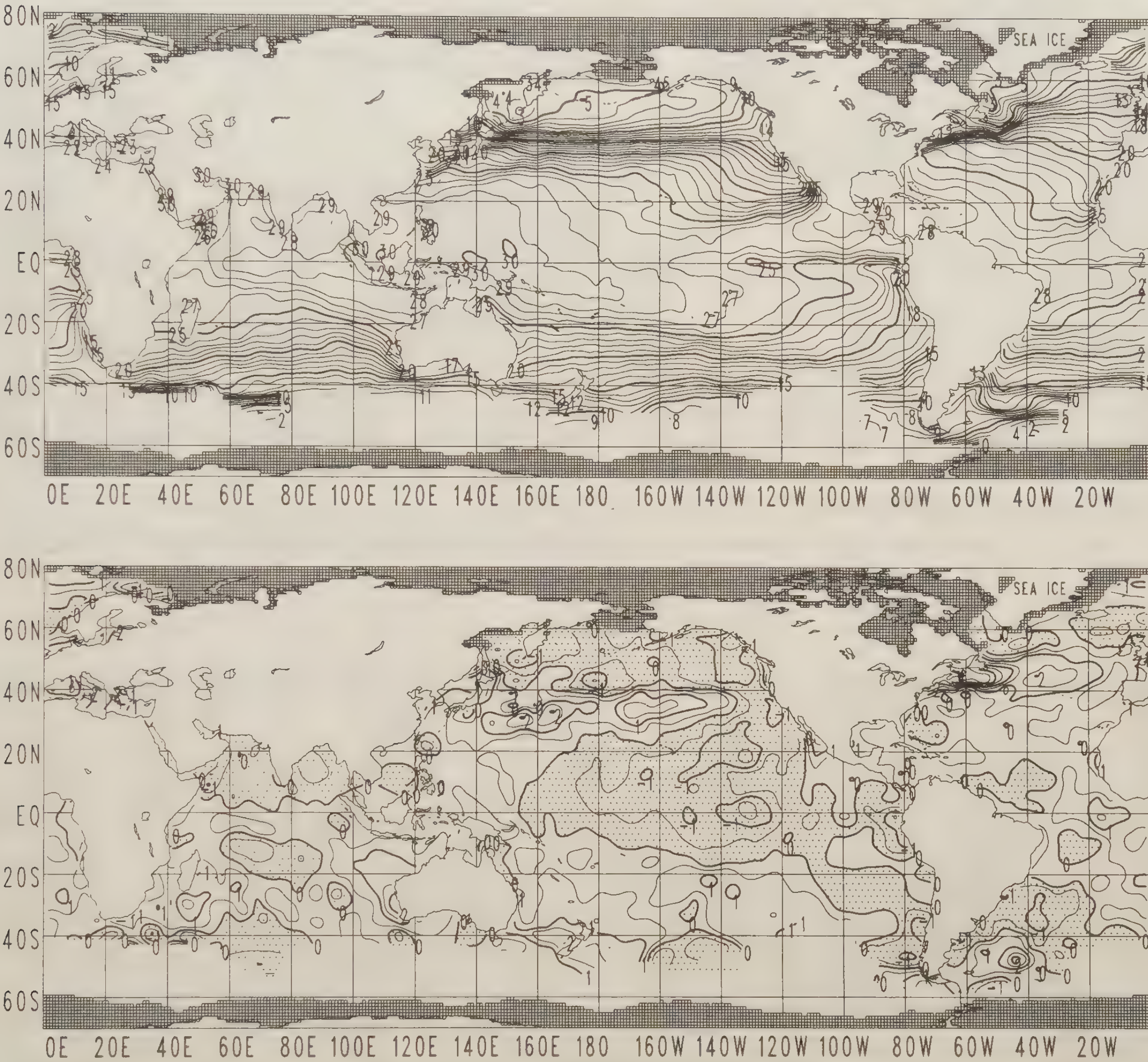
Ocean Data Buoy Observations



第15図　海洋気象ブイロボットによる観測要素の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

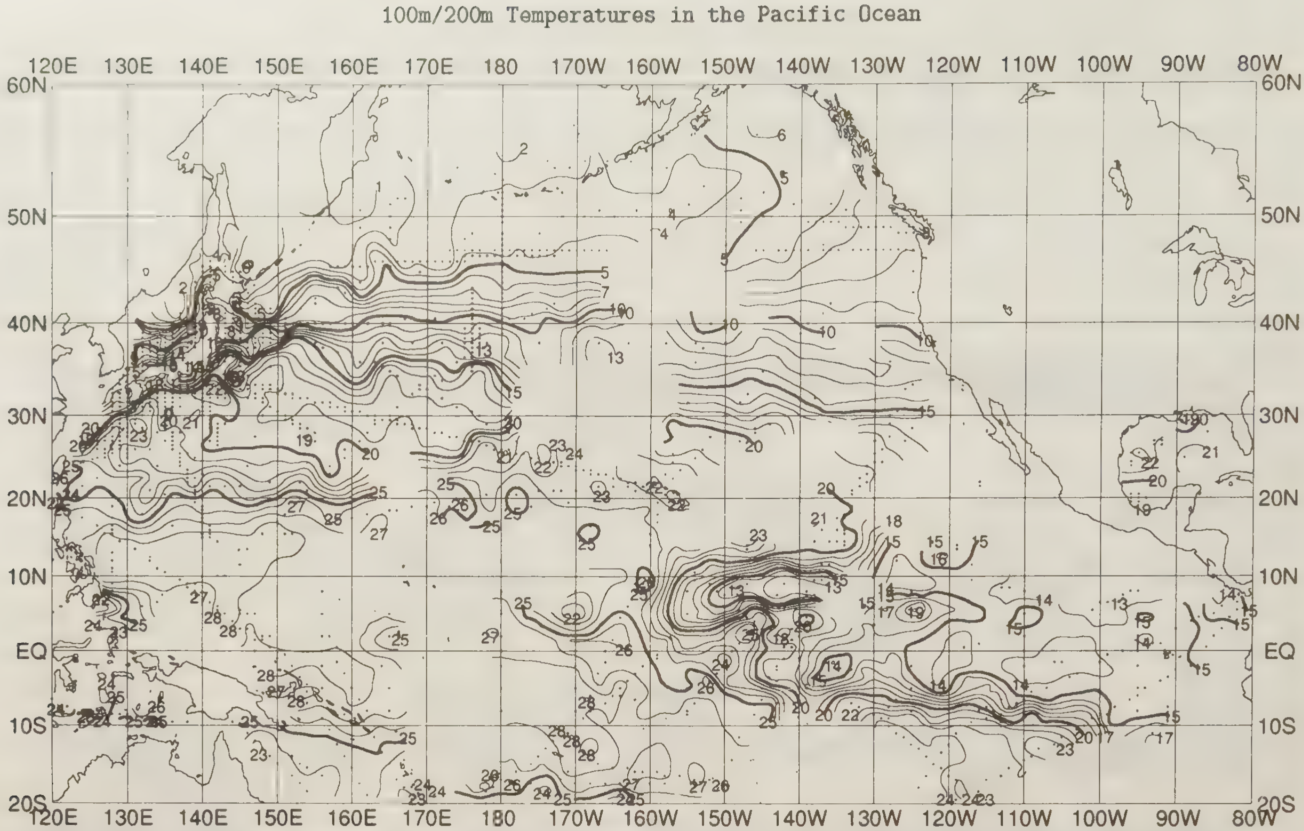
Fig.15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.

SST & Anomalies in the Global Ocean



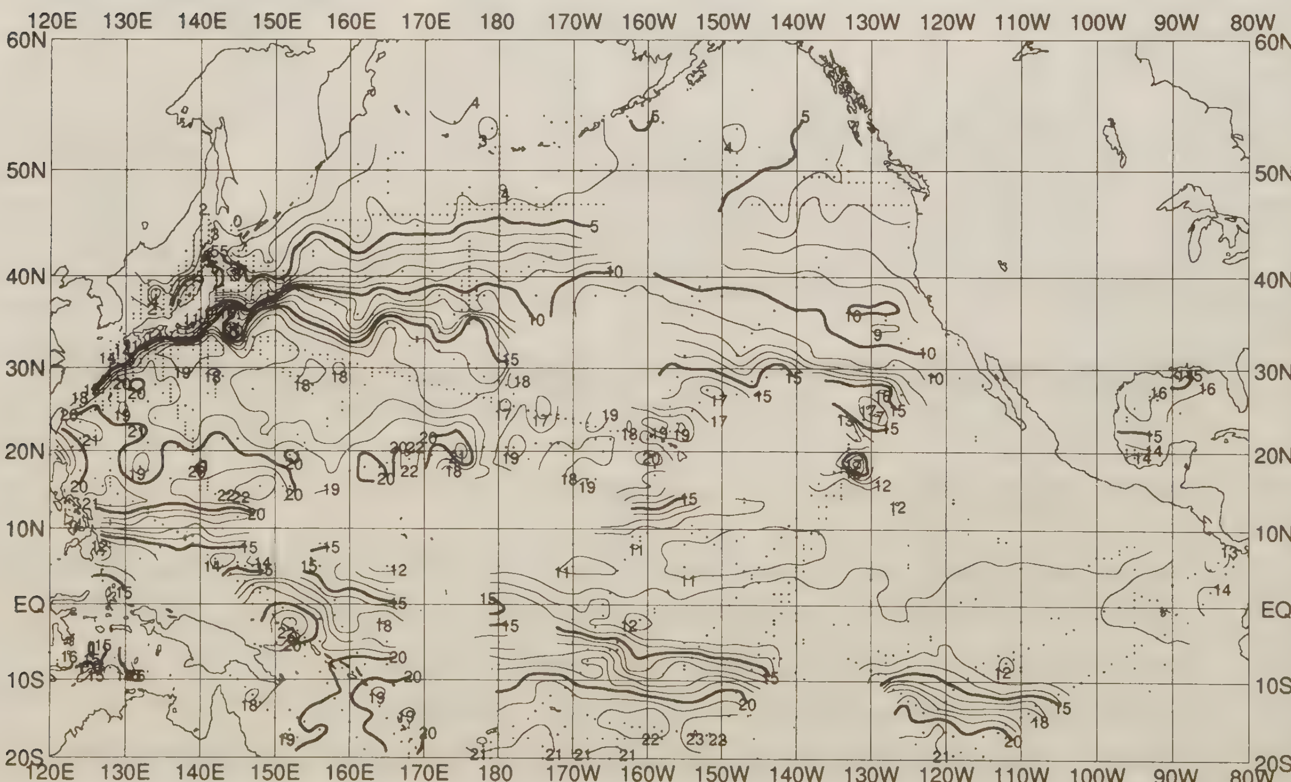
第16図　全球月平均海面水温図（上）及び偏差図（下）（1999年 6月）

Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for JUN 1999. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown by thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).



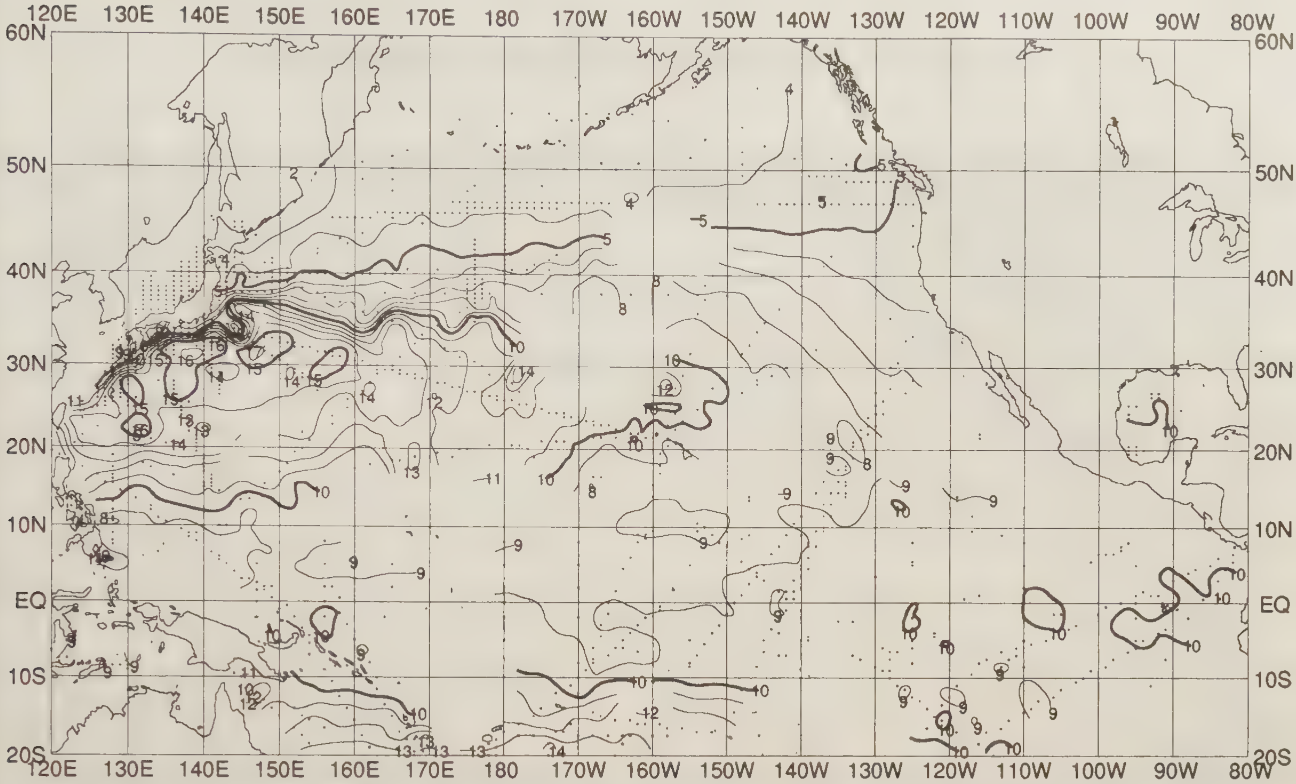
第 17 図　太平洋表層水温図（深さ 100 m）（1999 年 6 月）

Fig. 17　Subsurface (100 m) temperatures in the Pacific Ocean for June 1999. Contour interval is 1 ˚C. Observation points are denoted by dots.



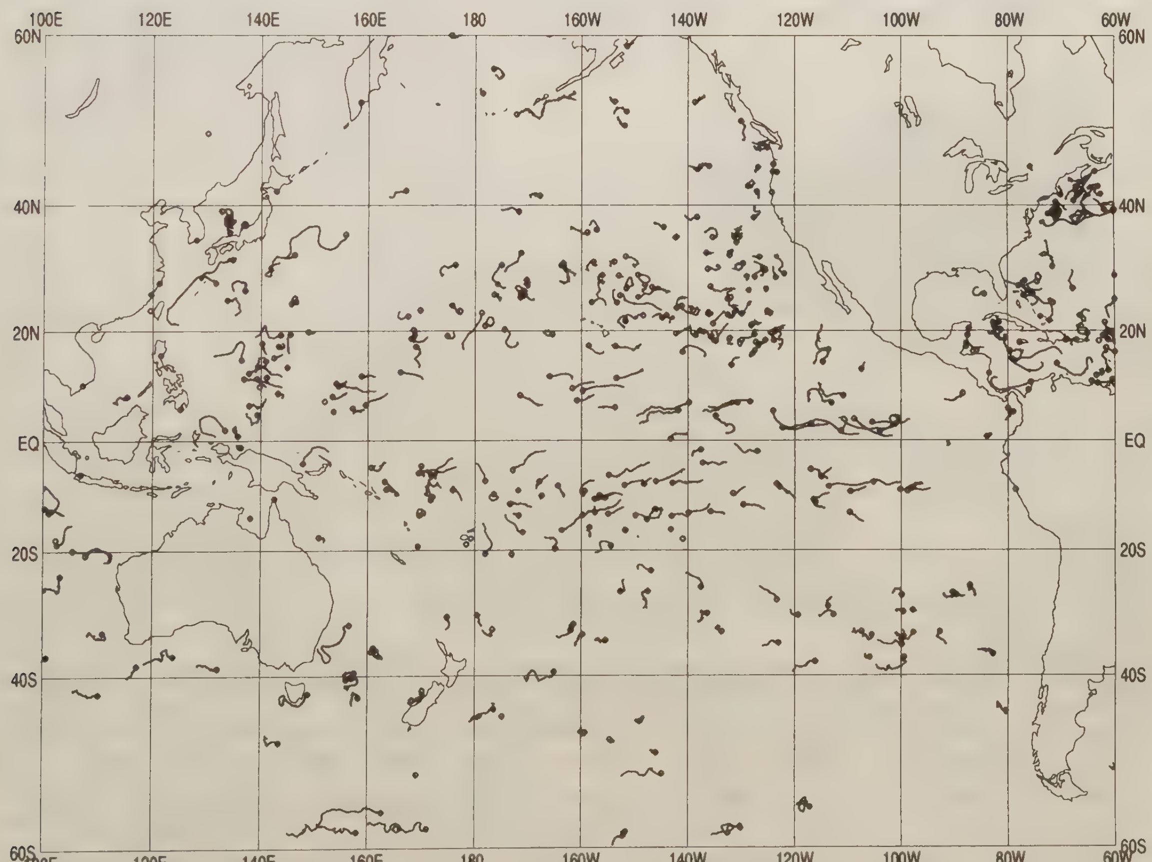
第 18 図　太平洋表層水温図（深さ 200 m）（1999 年 6 月）

Fig. 18　Subsurface (200 m) temperatures in the Pacific Ocean for June 1999. Contour interval is 1 ˚C. Observation points are denoted by dots.



第 19 図　太平洋表層水温図（深さ 400 m）（1999 年 6 月）

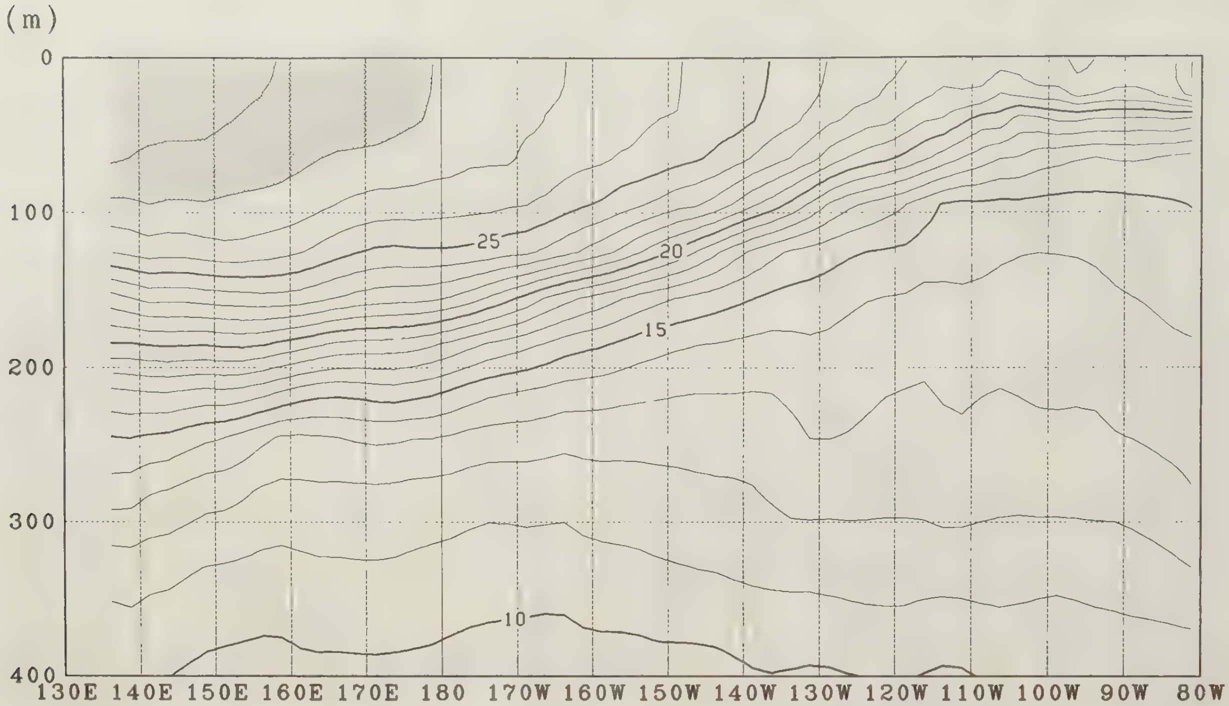
Fig. 19　Subsurface (400 m) temperatures in the Pacific Ocean for June 1999. Contour interval is 1 ℃. Observation points are denoted by dots.

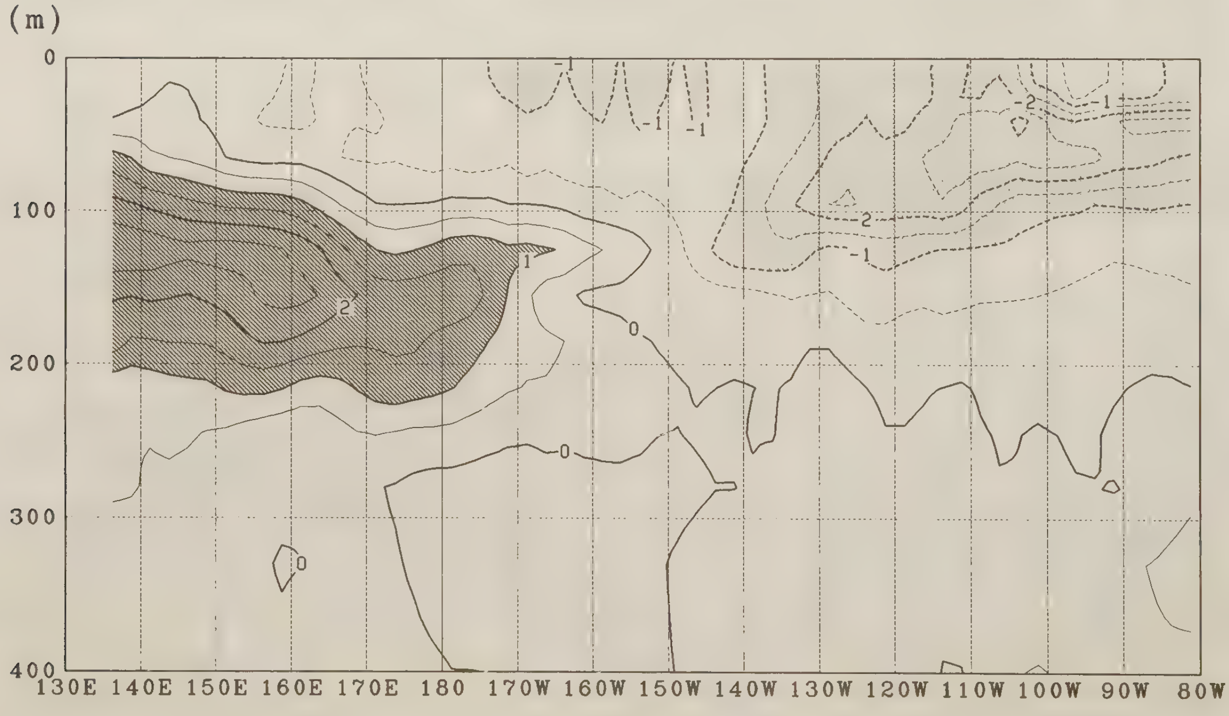


第 20 図　太平洋ブイ流跡図（1999 年 6 月）

Fig. 20　Movements of drifting buoys in the Pacific Ocean during June 1999. Each track is for one buoy. Small circles represent the last positions for the month.

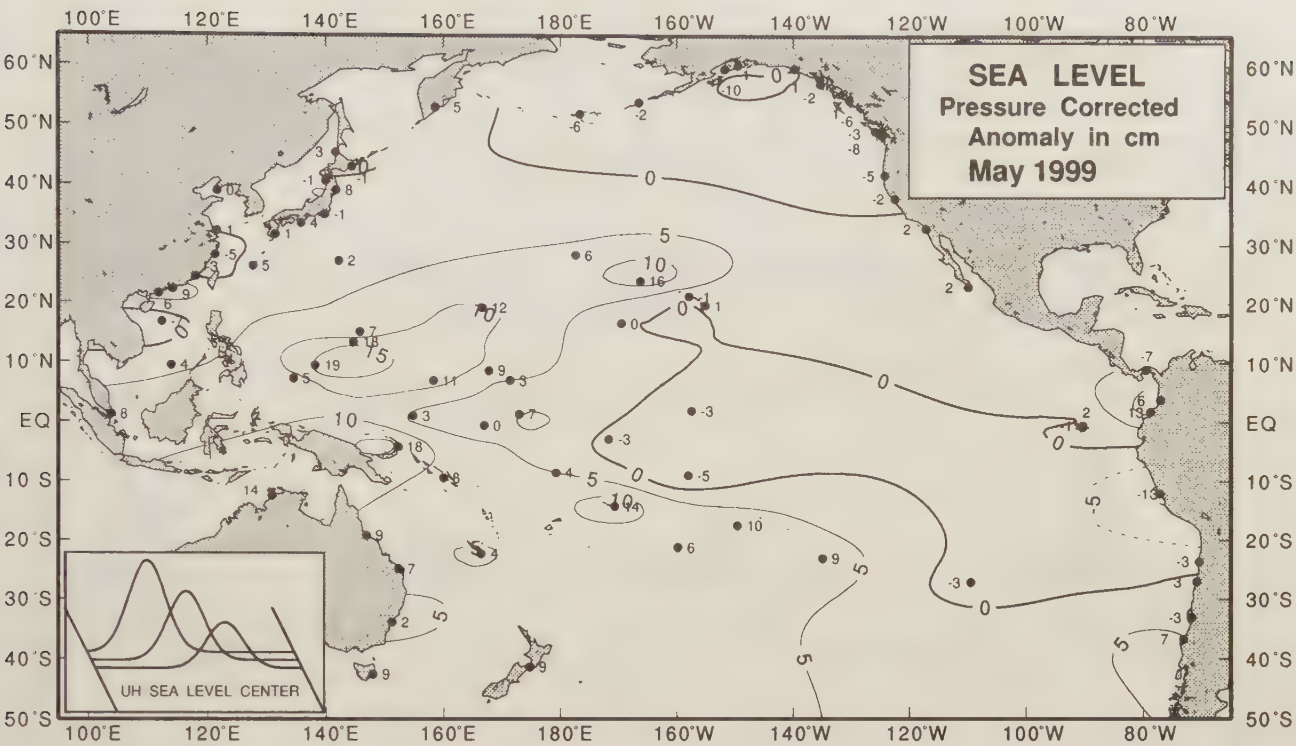
Depth-Longitude Sections of Equatorial Temperature & Anomalies





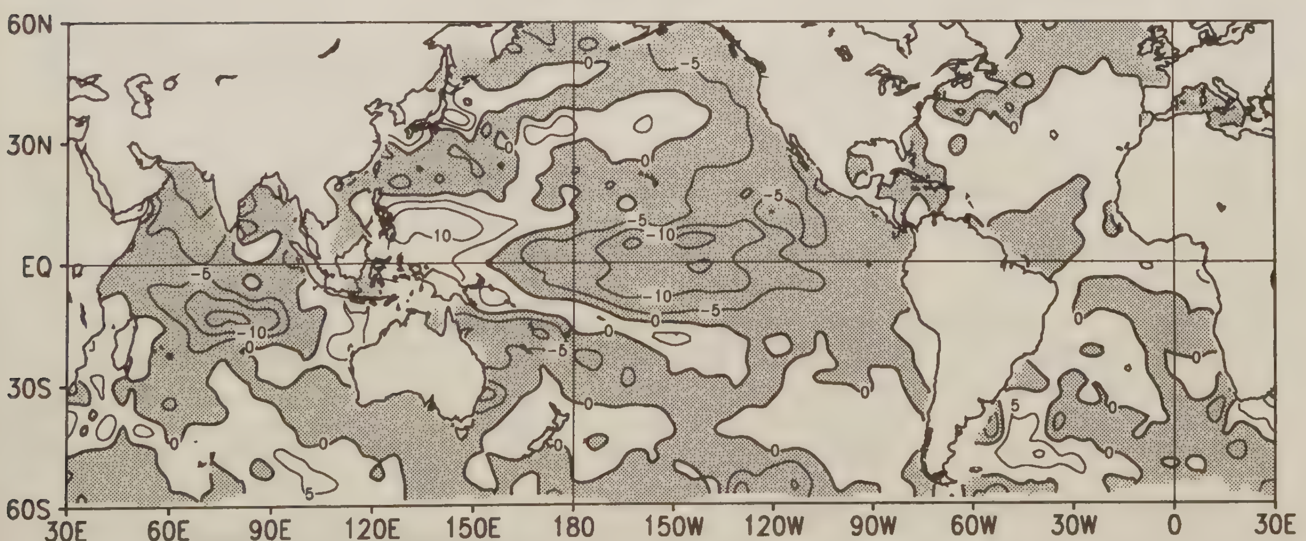
第21図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（1999年 6月）

Fig.21 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for JUN 1999. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in the top panel are shaded. In the bottom panel, values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1998 base period means.



第 22 図　太平洋月平均海面水位偏差図（1999 年 5 月）

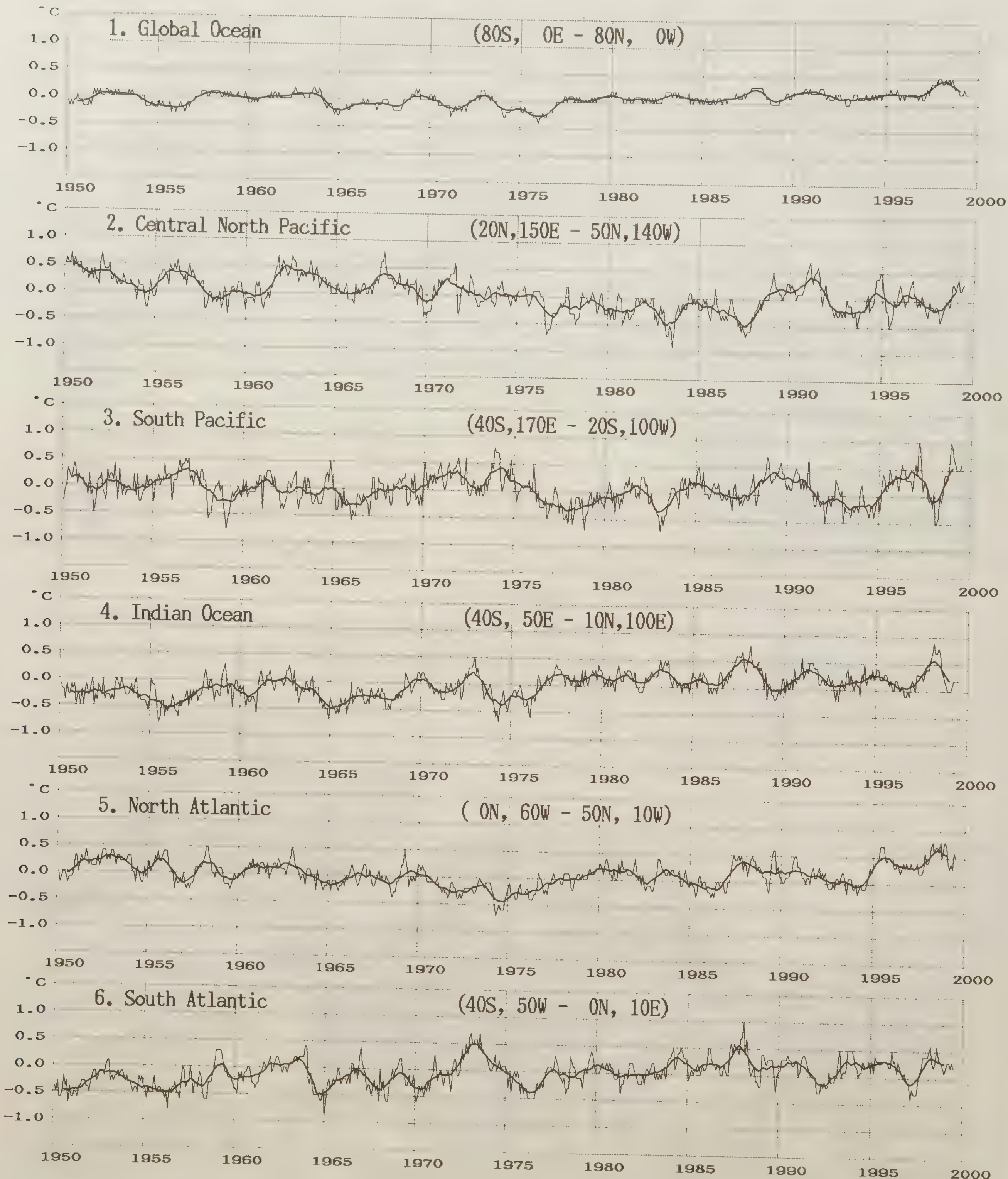
Fig. 22　Monthly sea level anomalies for May 1999 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure. This figure is prepared by the SOC of ISLP-PAC, Department of Oceanography, University of Hawaii.



第 23 図　全球月平均海面高度偏差図（1999 年 5 月）

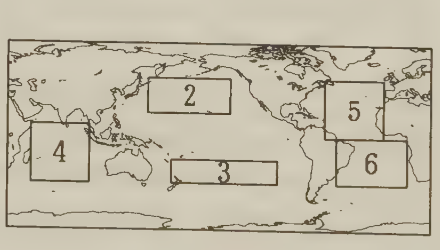
Fig. 23　Monthly sea surface height anomalies in the global ocean derived from the altimeter data of TOPEX/POSEIDON for May 1999. Contour interval is 5 cm. Negative anomalies are spotted. Anomalies are computed from 1993-1998 base period means.

Long-term Variation of Monthly Mean SST Anomalies

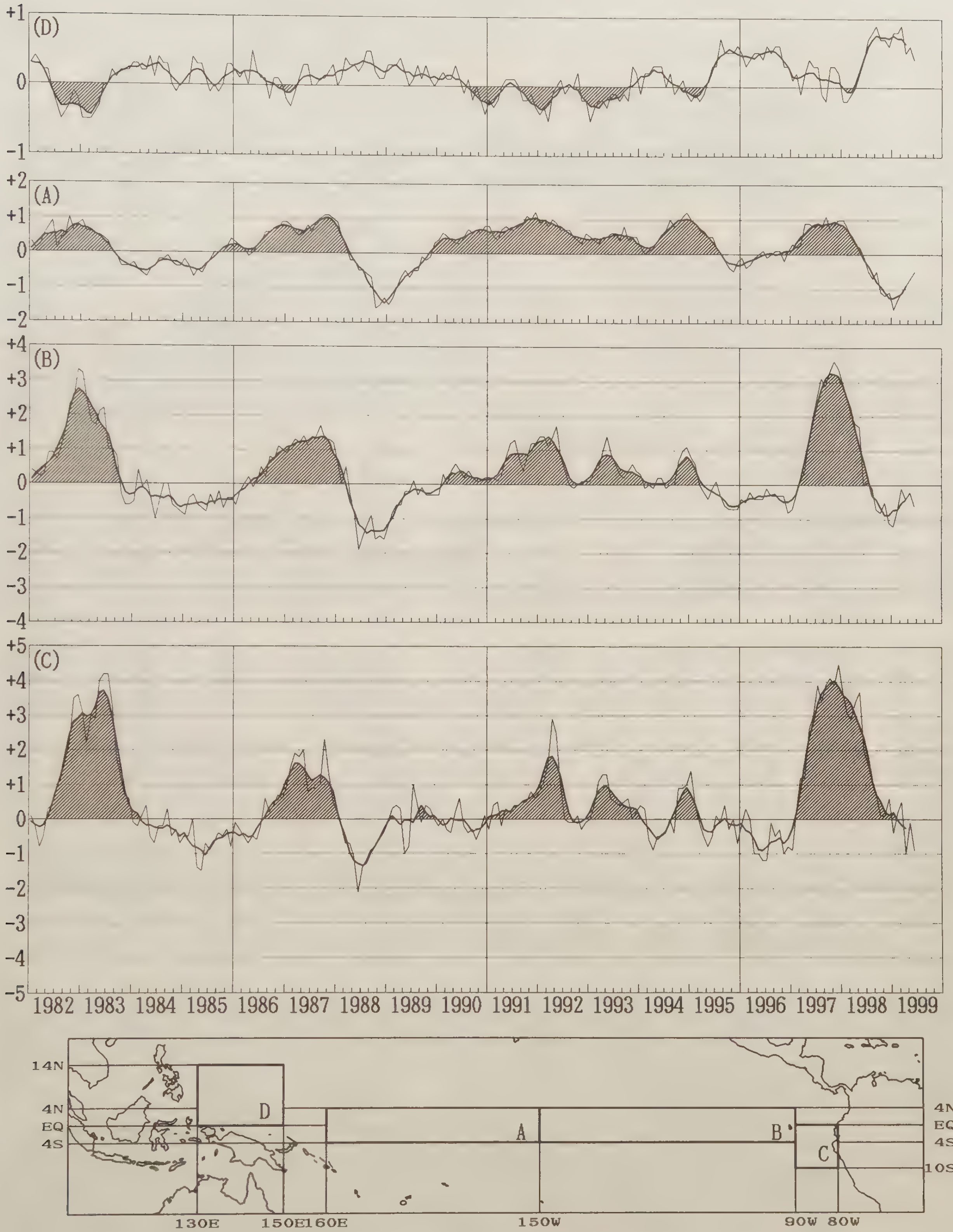


第24図 海域平均海面水温偏差の長期変動

Fig.24 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.



Time Series of Equatorial Pacific SST Anomalies



第25図　太平洋赤道域の海面水温偏差時系列図

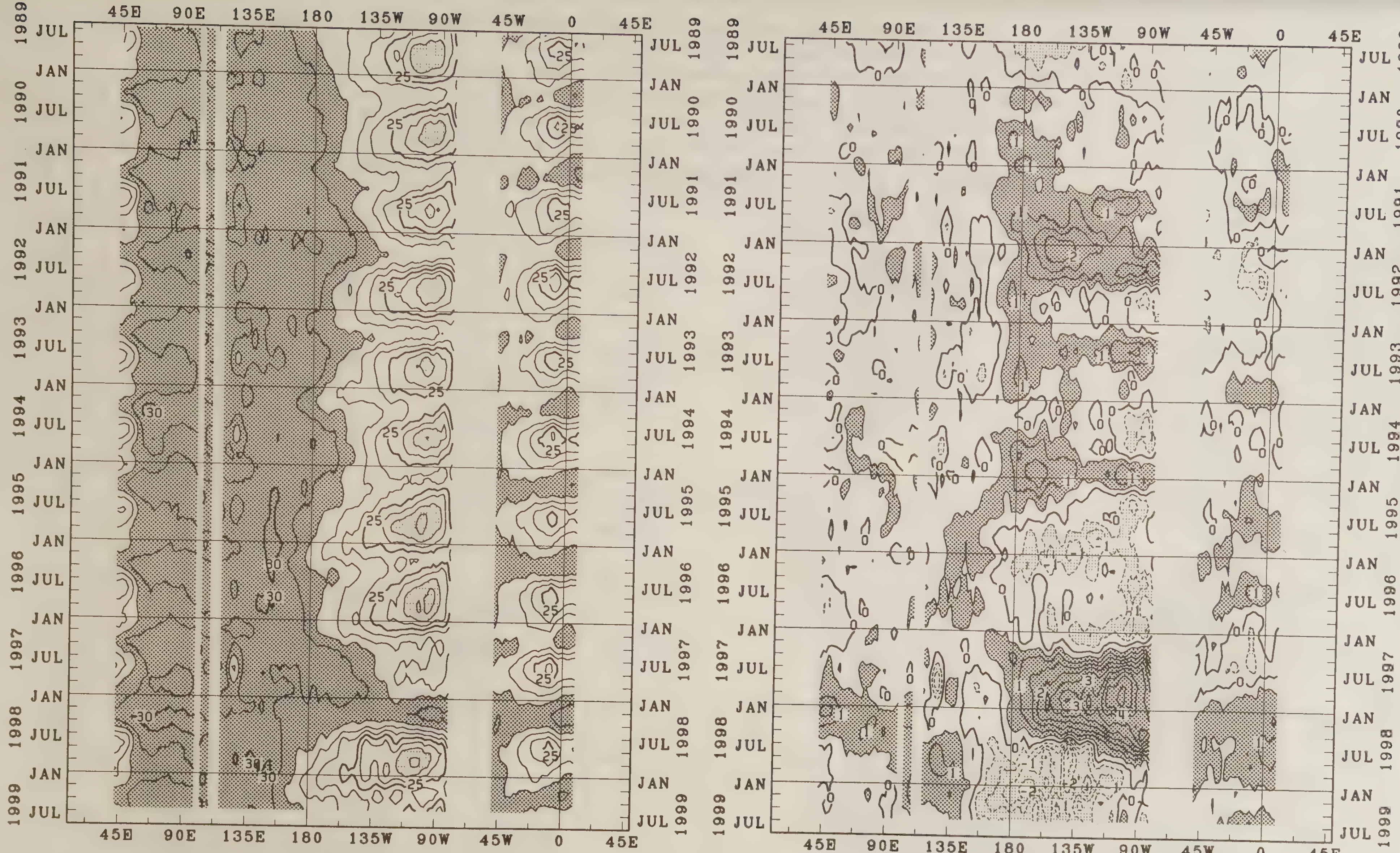
Fig.25 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom panel. Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

El Nino Monitoring Indices

MONTH	SEA SURFACE TEMPERATURE AND ANOMALY (°C) REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	SEA LEVEL PRESSURE ANOMALY (hPa) TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 97	28.6	0.1	28.3	0.3	24.7	-0.7	23.4	-0.9	0.3	1.7	0.9
FEB 97	28.5	0.2	28.2	0.2	25.9	-0.3	25.9	0.2	1.2	1.0	-1.9
MAR 97	28.3	-0.1	28.4	0.3	27.0	0.1	27.1	1.2	-0.6	-0.5	0.9
APR 97	29.0	0.2	29.1	0.9	27.5	0.4	26.3	1.2	-1.1	0.4	2.3
MAY 97	29.5	0.4	29.4	0.9	27.9	1.3	26.5	2.6	-2.5	-2.1	0.9
JUN 97	29.6	0.3	29.3	0.8	28.1	2.0	25.7	3.0	-2.3	-0.8	2.1
JUL 97	29.5	0.3	29.4	0.9	27.8	2.6	25.5	3.9	-0.8	-0.1	1.2
AUG 97	29.0	-0.1	29.2	0.8	27.7	3.1	24.0	3.4	-2.0	-0.9	2.2
SEP 97	29.0	-0.2	29.4	1.1	27.5	2.9	24.2	3.9	-1.4	0.1	2.7
OCT 97	29.6	0.3	29.1	0.7	27.9	3.3	24.8	4.1	-1.6	-0.2	2.7
NOV 97	29.5	0.3	29.3	0.9	28.2	3.6	25.4	3.9	-1.2	0.4	2.7
DEC 97	29.1	0.2	29.2	1.0	28.3	3.4	27.1	4.5	-0.9	-0.5	1.1
JAN 98	28.3	-0.2	29.0	1.0	28.4	3.0	28.0	3.7	-2.3	-3.6	1.4
FEB 98	28.1	-0.2	28.8	0.8	28.8	2.6	28.8	3.1	-1.8	-0.9	3.5
MAR 98	28.3	-0.1	28.6	0.5	29.0	2.1	28.8	2.9	-2.5	-2.8	2.3
APR 98	28.8	0.0	28.5	0.3	28.9	1.8	28.5	3.4	-2.3	-1.5	1.4
MAY 98	29.3	0.2	28.7	0.2	28.3	1.7	27.6	3.7	0.0	0.4	0.5
JUN 98	29.7	0.4	28.4	-0.1	26.1	0.0	24.7	2.0	1.1	0.9	-0.5
JUL 98	29.9	0.7	28.0	-0.5	25.3	0.1	23.2	1.6	1.5	1.8	-0.6
AUG 98	29.9	0.8	27.7	-0.7	24.5	-0.1	21.7	1.1	1.0	1.4	-0.2
SEP 98	30.1	0.9	27.8	-0.5	23.9	-0.7	21.0	0.7	1.0	1.4	-0.4
OCT 98	30.0	0.7	27.3	-1.1	23.8	-0.8	20.8	0.1	1.2	0.8	-1.1
NOV 98	29.9	0.7	27.2	-1.2	24.1	-0.5	21.6	0.1	1.0	0.4	-1.5
DEC 98	29.5	0.6	27.1	-1.1	23.8	-1.1	23.2	0.6	1.5	1.1	-1.5
JAN 99	29.3	0.8	26.4	-1.6	24.2	-1.2	23.9	-0.4	1.5	1.8	-1.5
FEB 99	29.1	0.8	26.7	-1.3	25.5	-0.7	25.9	0.2	0.8	1.3	-0.6
MAR 99	29.3	0.9	27.0	-1.1	26.8	-0.1	26.4	0.5	0.8	0.4	-1.3
APR 99	29.3	0.5	27.3	-0.9	26.7	-0.4	24.1	-1.0	1.8	1.3	-0.9
MAY 99	29.7	0.6	27.8	-0.7	26.4	-0.2	23.8	-0.1	0.3	1.1	1.1
JUN 99	29.7	0.4	28.0	-0.5	25.5	-0.6	21.8	-0.9	0.1	0.6	0.4

第1表　エルニーニョ監視指数

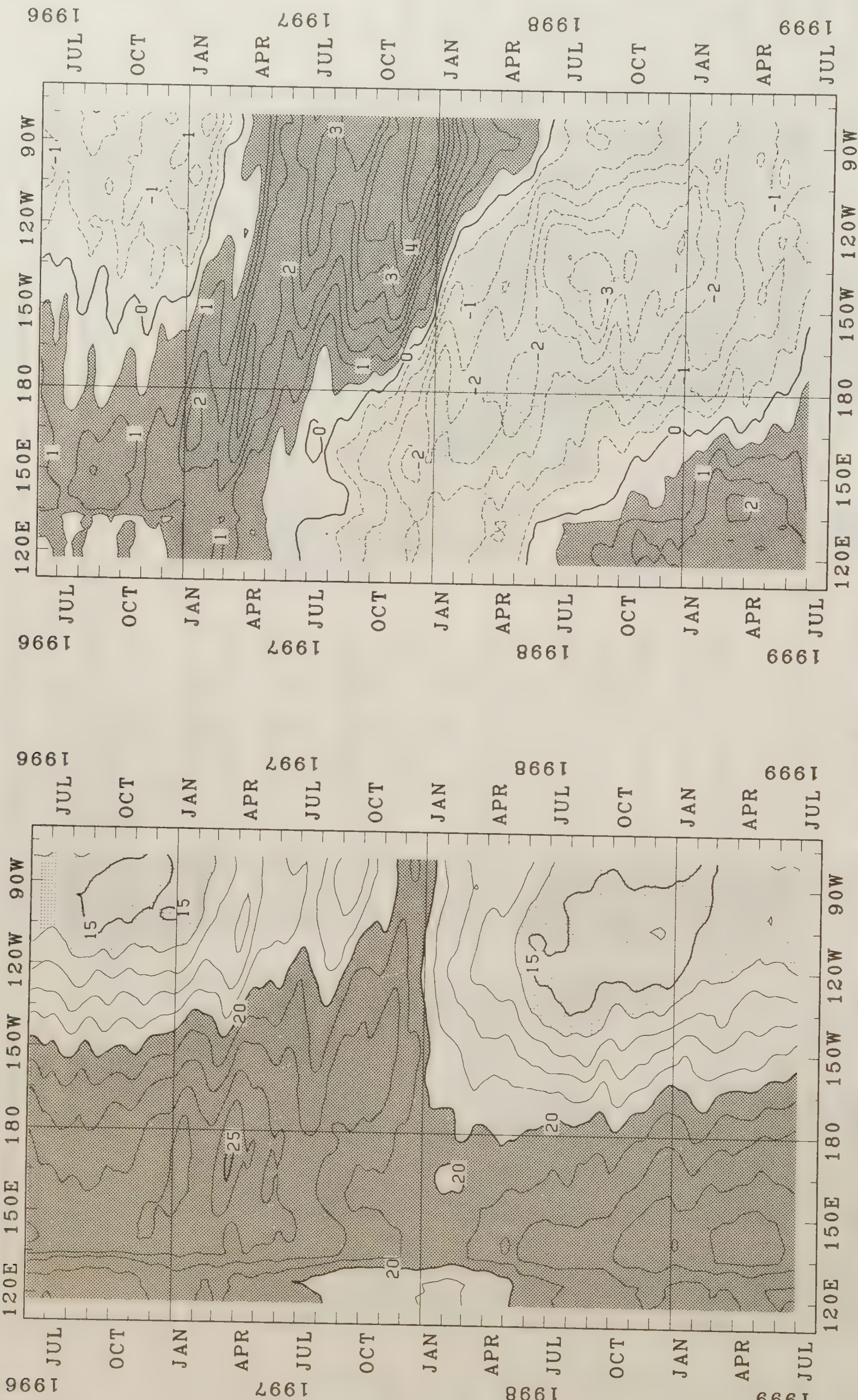
Table 1 El Nino Monitoring indices



第 26 図　赤道に沿った海面水温（左）及び偏差（右）の時間-経度断面図

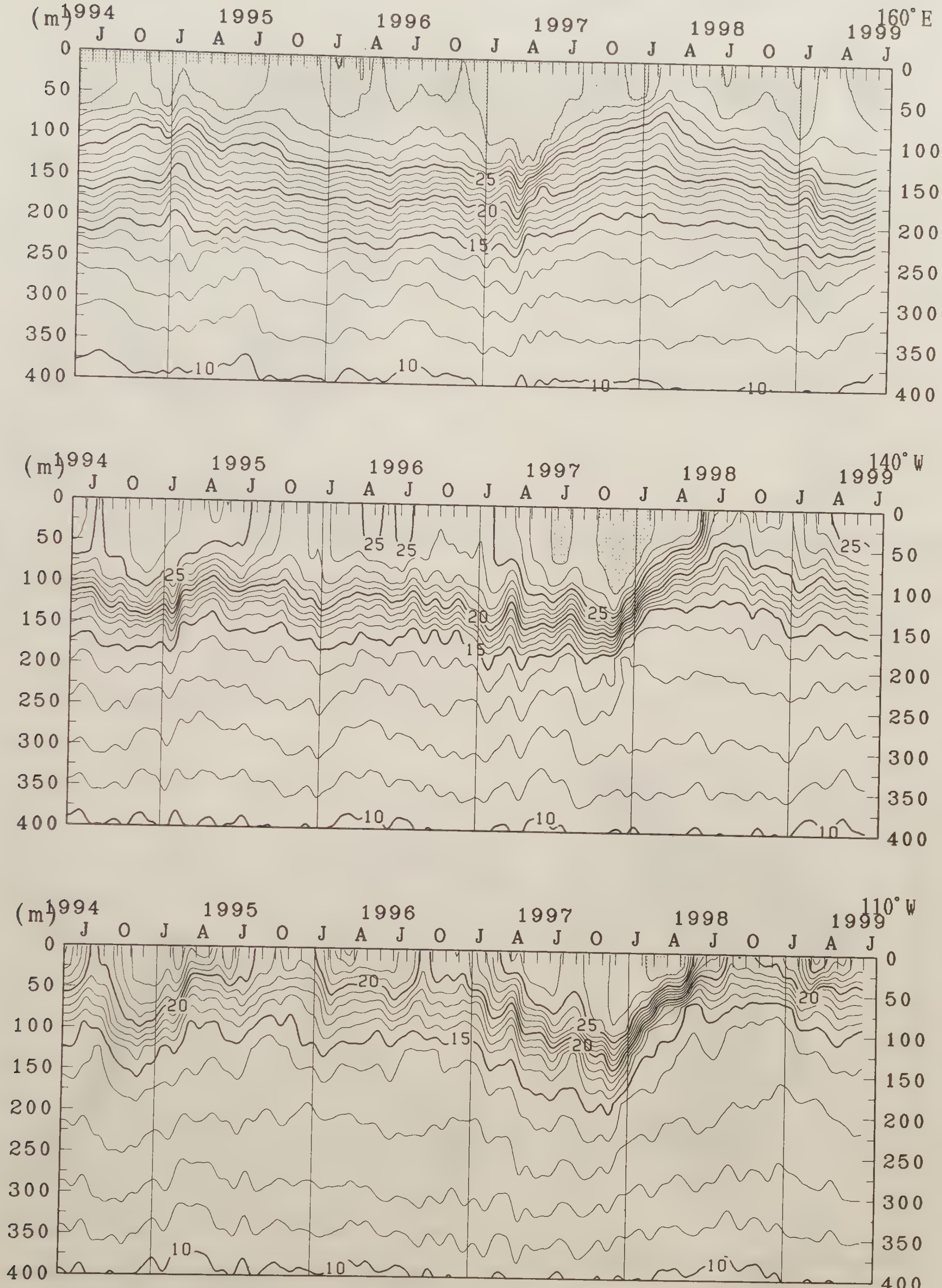
Fig. 26　Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2 °N-2 °S) in the global ocean. Contour interval is 1 ℃ (left) and 0.5 ℃ (right). Values greater than 28 ℃ are shaded and values less than 23 ℃ are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1961-1990 base period means.

Time-Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



第27図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

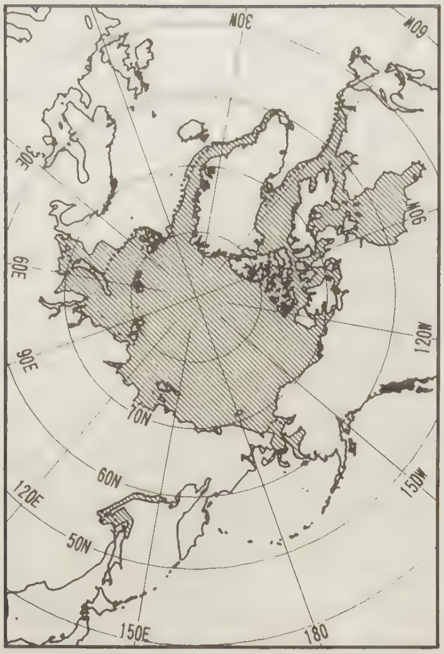
Fig.27 Time-longitude sections of ocean heat content in the upper 260 m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 20°C are shaded and values less than 16°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1987-1998 base period means.



第28図　太平洋赤道域の表層水温の時間－深度断面図

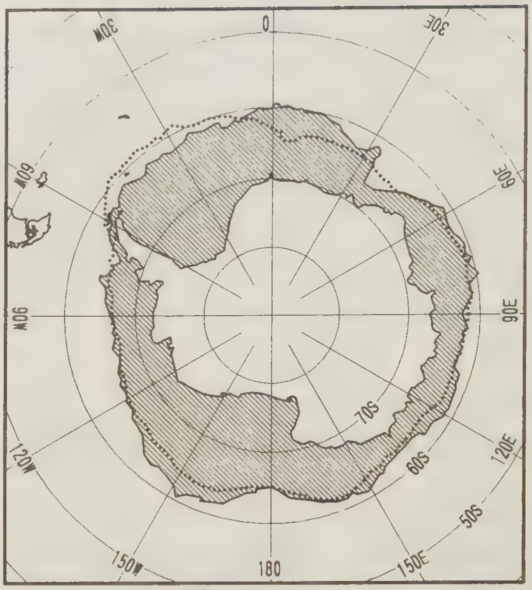
（上：西部、中：中部、下：東部）

Fig.28 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.



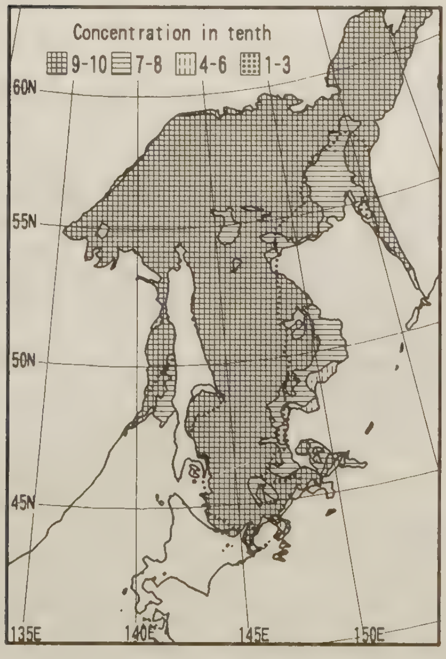
第29-1図　北極域の海氷図（1999年 6月16日）

Fig.29-1 Sea ice chart in the Arctic on 16 June 1999.
The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.
The data source is the National Ice Center (USA).



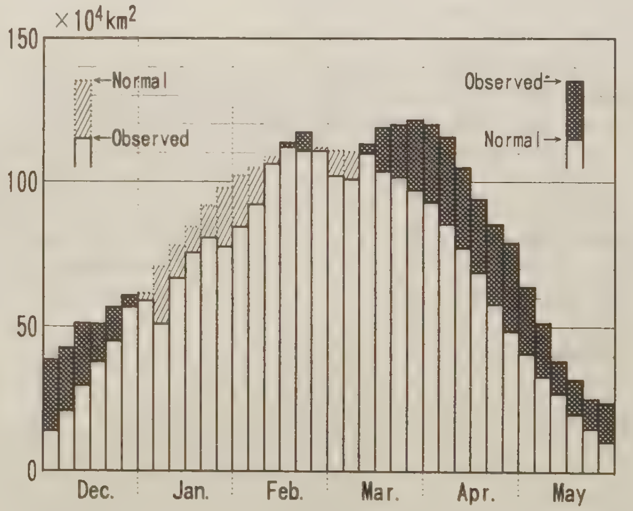
第29-2図　南極域の海氷図（1999年 6月16日）

Fig.29-2 Sea ice chart in the Antarctic on 16 June 1999.
The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1973 through 1990.
The data source is the National Ice Center (USA).



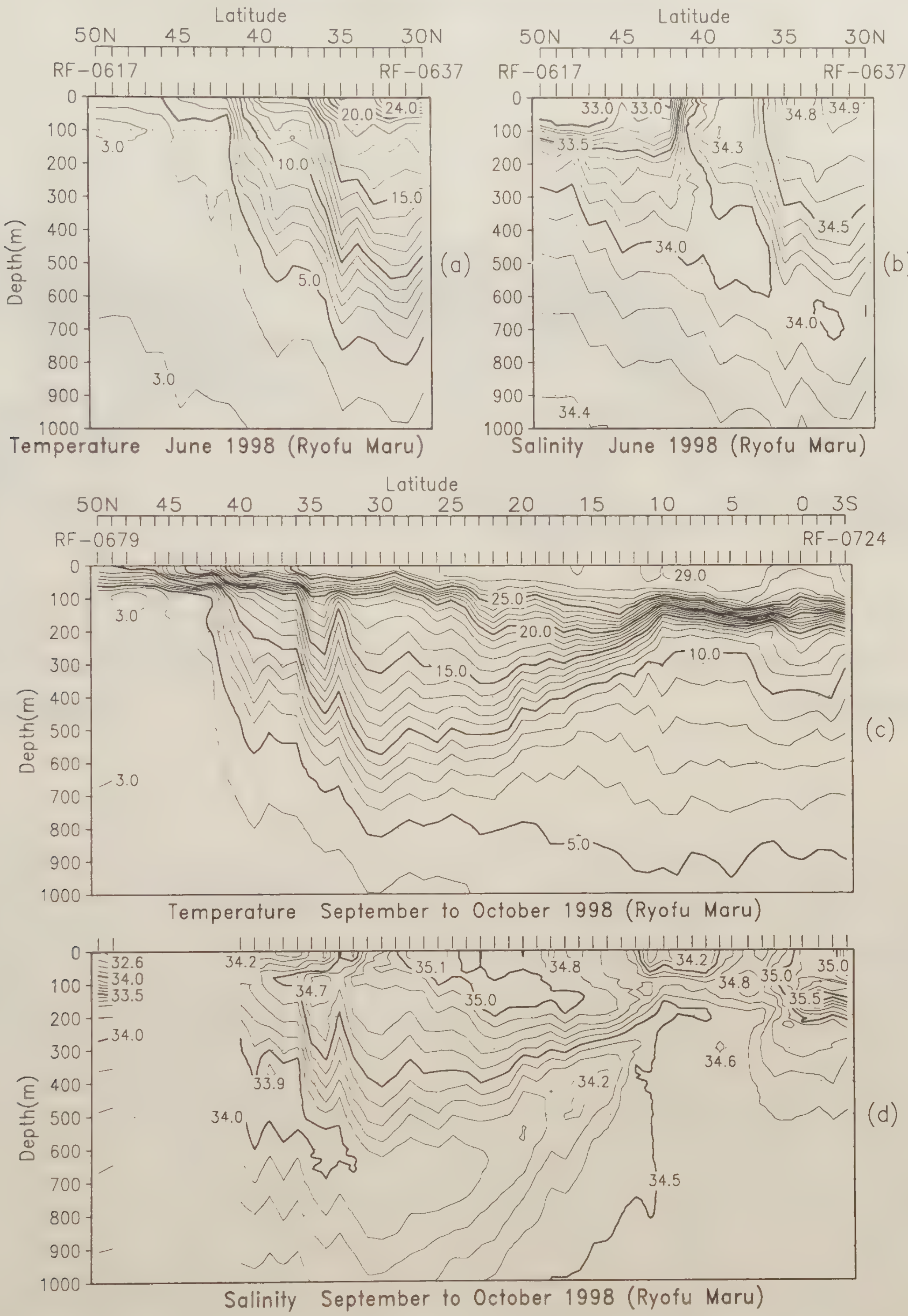
第29-3図　オホーツク海の海氷域面積が最大であった日の海氷分布図(1999年 3月31日)

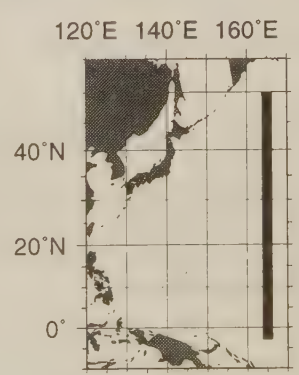
Fig.29-3 Sea ice chart in the Sea of Okhotsk on 31 Mar. 1999, when the largest sea ice extent was recorded in the season.
The dotted line denotes the mean ice edge averaged for the period from 1971 through 1995.



第29-4図 オホーツク海半旬海氷域面積（1998/99）

Fig.29-4 Time series of 5-day sea ice extent in the Sea of Okhotsk (1998/99)

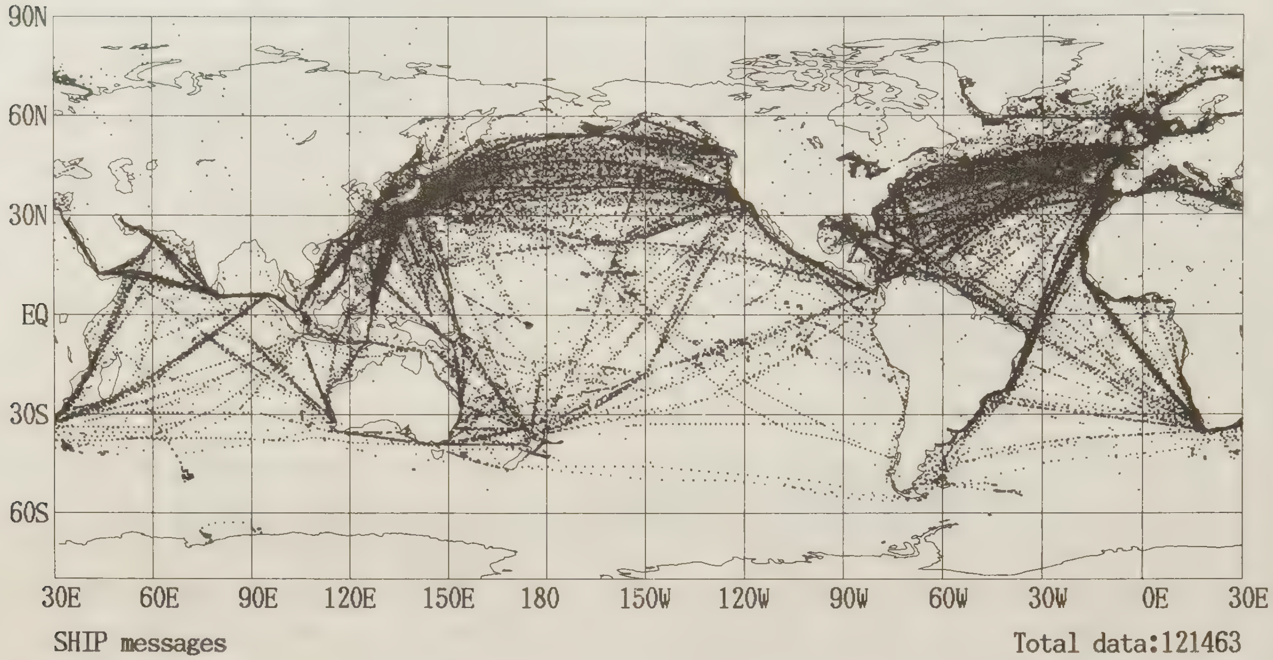


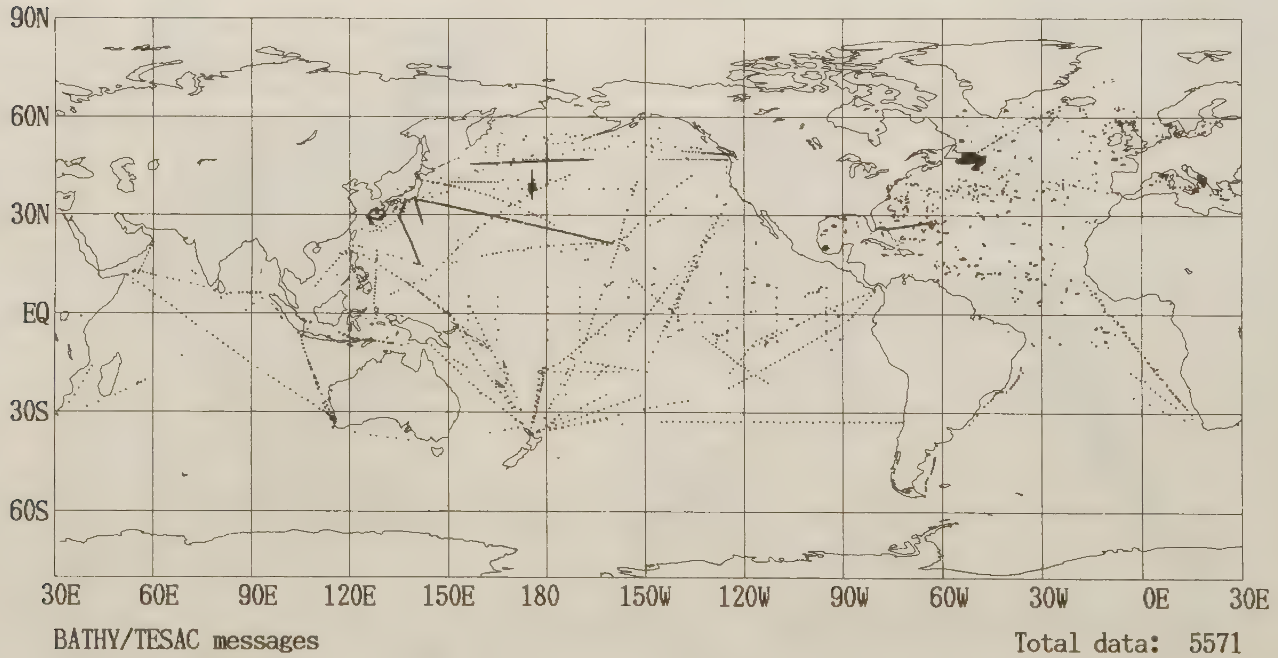


(e)

第 30 図 東経 165 度に沿った鉛直断面図. (a) 水温 (1998 年 6 月), (b) 塩分 (1998 年 6 月), (c) 水温 (1998 年 9～10 月), (d) 塩分 (1998 年 9～10 月), (e) 観測位置図.

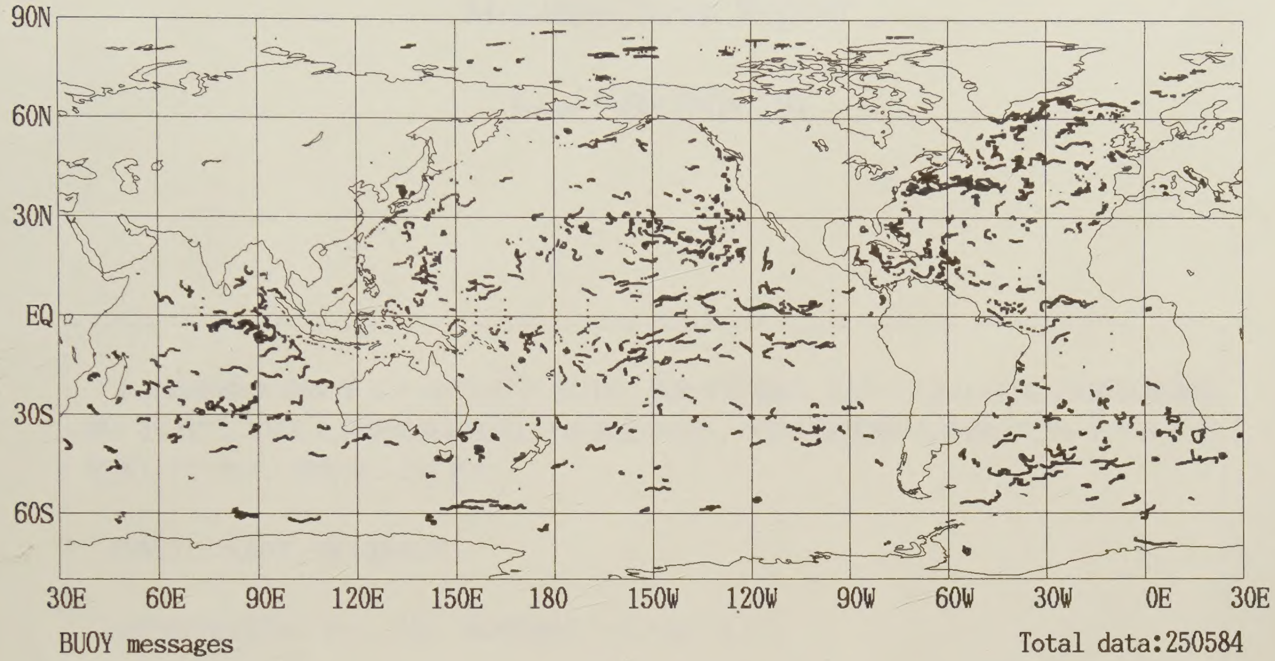
Fig. 30 Vertical sections along 165°E observed by R/V Ryofu Maru. (a) Water temperature observed in June 1998, (b) Salinity observed in June 1998, (c) Water temperature observed from September to October 1998, (d) Salinity observed from September to October 1998, (e) Location of the observation line.

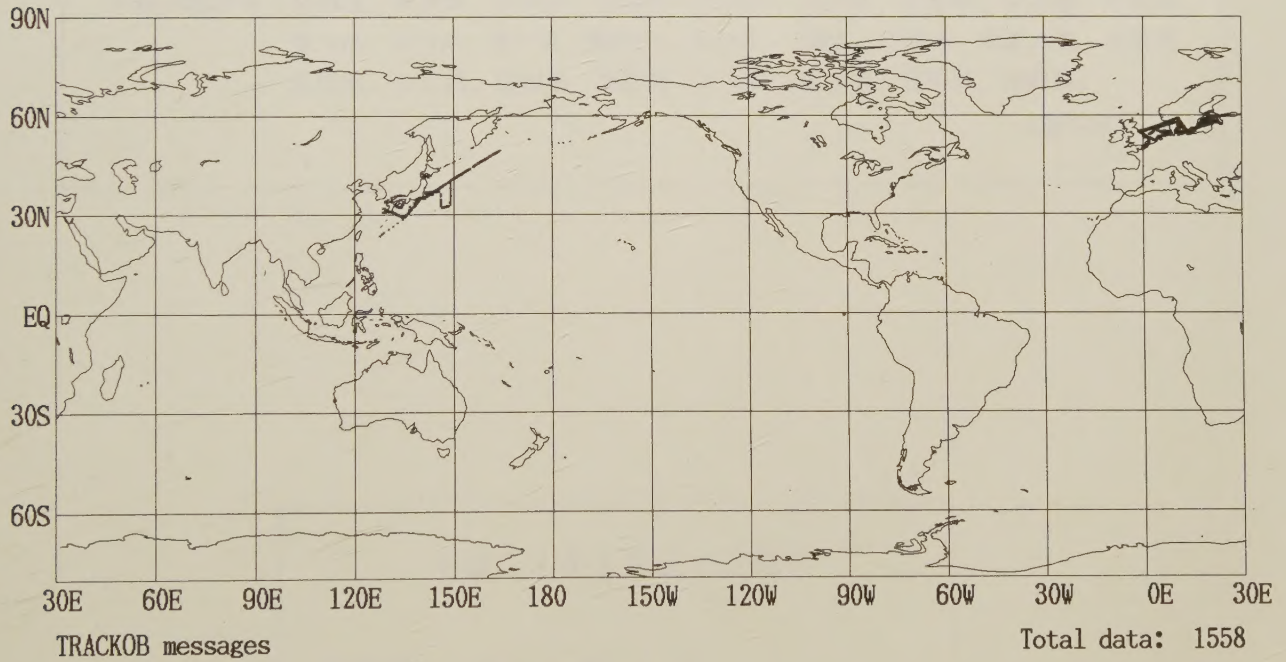




第31-1図　測点分布図(1999年 6月)

Fig.31-1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for JUN 1999.





第31-2図　測点分布図(1999年 6月)

Fig.31-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for JUN 1999.

気象庁海洋月報

Monthly Ocean Report

June 1999 (No. 78)

本月報掲載の 1999 年 6 月のプロダクトには、気象庁が観測したデータ及び GTS（全球気象通信網）を通じて入手した国際気象通報式による通報のほか、下記の機関等から提供いただいたデータを使用しています。御礼申し上げます。

防衛庁、水産庁、海上保安庁

海洋科学技術センター、（社）漁業情報サービスセンター

東北大学、東京大学、鹿児島大学

水産試験場等（北海道、青森県、岩手県、宮城県、秋田県、山形県、茨城県、東京都、新潟県、富山県、石川県、福井県、静岡県、愛知県、三重県、兵庫県、和歌山県、鳥取県、島根県、山口県、高知県、福岡県、佐賀県、熊本県、宮崎県、沖縄県）

（順不同）

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